

**A TOY PROPOSAL FOR ALTERNATIVE USE OF
POLYETHYLENE POOL NOODLES IN AQUATIC
TOY DESIGN**

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**by
Merter YALÇINKAYA**

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ABSTRACT

A TOY PROPOSAL FOR ALTERNATIVE USE OF POLYETHYLENE POOL NOODLES IN AQUATIC TOY DESIGN

The study focuses on the design of aquatic toys, which is a special area of industrial toy design in general.

Many times, with their various aspects, toys have been among the research subjects of several specialties. Industrial design, which deals with the subject from various perspectives, especially “toy design”, is one of these research and application areas. Although many academic studies have been carried out in the field of industrial toy design, it is seen that there is an academic gap especially in the industrial design of aquatic toys.

Looking at the overall aquatic toy market, it is seen that inflatable PVC products dominate the market. This brings to mind the question of what new approaches could be in aquatic toy design. As an answer to this question, it can be said that the use of alternative materials has emerged as a remarkable option. In this sense, the idea of investigating the potentials of using PE pool noodles as an alternative design element/material in aquatic toy design constitutes the starting point of the study.

In this study, an aquatic toy prototype proposal and its design process are presented in order to understand the potential of using PE pool noodles as a structural component of an aquatic toy and to exemplify the aquatic toy design which is the main subject of the research. The prototype had been evaluated by the potential users. Their comments had been depicted as findings of the analysis and suggested for further development.

Keywords: *Aquatic Toys, Polyethylene Pool Noodles, Toy Design, Concept Generation, Concept Development, Prototype*

ÖZET

SUCUL OYUNCAK TASARIMINDA POLİETİLEN HAVUZ MAKARNALARININ ALTERNATİF KULLANIMI İÇİN BİR OYUNCAK ÖNERİSİ

Bu çalışma, genel olarak endüstriyel oyuncak tasarımının özel bir alanı olan sucul oyuncakların tasarımı konusuna odaklanmaktadır.

Oyuncaklar, birçok kez çeşitli yönleriyle değişik uzmanlık alanlarının araştırma konuları arasında yer almışlardır. Başta “oyuncak tasarımı” olmak üzere konuyu çeşitli açılardan ele alan endüstriyel tasarım da bu araştırma ve uygulama alanlarından biridir. Endüstriyel oyuncak tasarımı alanında da birçok akademik araştırma yapılmış olmakla birlikte, özellikle sucul oyuncakların endüstriyel tasarımı konusunda akademik anlamda alansal bir boşluk olduğu görülmektedir.

Genel sucul oyuncak pazarına bakıldığında, şişirilebilir PVC ürünlerin piyasaya hakim olduğu gözlenmektedir. Bu da beraberinde sucul oyuncak tasarımında yeni yaklaşımların neler olabileceği sorusunu akla getirmektedir. Bu sorunun bir cevabı olarak, alternatif malzeme kullanımının dikkate değer bir seçenek olarak ortaya çıktığı söylenebilir. Bu anlamda, sucul oyuncak tasarımında alternatif bir tasarım ögesi/malzemesi olarak PE (polietilen) havuz makarnalarının kullanım potansiyellerinin araştırılması fikri çalışmanın çıkış noktasını oluşturmaktadır.

Bu çalışmada, sucul bir oyuncakın yapısal bileşeni olarak PE havuz makarnalarının kullanım potansiyelini anlamak ve araştırmanın ana konusu olan sucul oyuncak tasarımını örneklendirmek için bir sucul oyuncak prototip önerisi ve bunun tasarım süreci sunulmuştur. Prototip, potansiyel kullanıcılar tarafından değerlendirilmiştir. Kullanıcı yorumları, analizin bulguları olarak tasvir edilmiş ve daha fazla geliştirme için önerilmiştir.

Anahtar Kelimeler: *Sucul Oyuncaklar, Polietilen Havuz Makarnaları, Oyuncak Tasarımı, Kavram Üretme, Kavram Geliştirme, Prototip*

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LIST OF SYMBOLS/ABBREVIATIONS

- acc.d.:** Access date
- aka:** Also known as
- App.:** Appendix
- approx.:** Approximately
- Assoc. Prof.:** Associate Professor
- BC:** Before Christ
- CAD:** Computer Aided Design
- CAID:** Computer Aided Industrial Design
- CAM:** Computer Aided Manufacturing
- CD:** Compact Disc
- CEO:** Chief Executive Officer
- ChiS:** Child Survey
- DEU:** Dokuz Eylül University
- DFM:** Design For Manufacturability
- DIY:** Do It Yourself
- Dr.:** Doctor
- e.g.:** For example, for instance
- EoC/S:** Ease of Carriage/Storage
- EoU:** Ease of Use
- ExpS:** Expert Survey
- et al.:** And others
- etc.:** (Latin) Et cetera
- EVA:** Ethylene Vinyl Acetate (/Copolymer)
- Fig.:** Figure
- Freq.:** Frequency
- HDPE:** High Density Polyethylene
- ICSID:** International Council of Societies of Industrial Design

ID: Industrial Design

IDSA: The Industrial Designers Society of America

IT: Information Technology

i.g.: So, namely

IoU: Intelligibility of Use

IzTech: Izmir Institute of Technology

kgf (or kgF): Kilogram-force (measurement unit)

Lt: Lieutenant

LDPE: Low Density Polyethylene

MDF: Medium Density Fiberboard

MEB: (Turkish) Milli Eğitim Bakanlığı (Ministry of National Education)

MuCh: Multiple Choice (question/answer)

N: Newton (measurement unit)

n.d.: No date

OpEn: Open-Ended (question/answer)

OYDER: (Turkish) Oyuncakçılar Derneği (Toy Manufacturers Association)

PE: Polyethylene

Per.: Percentage

ParS: Parent Survey

PVC: Polyvinyl Chloride

RAT: Rideable Aquatic Toy/s

3D: Three Dimensional

TEGV: (Turkish) Türk Eğitim Gönüllüleri Vakfı (Turkish Education Volunteers Foundation)

TL: (Turkish) Türk Lirası (Turkish Liras)

Trans.: Translation

the UK: The United Kingdom

vs: (Latin) Versus

CHAPTER 1

INTRODUCTION

Toy design is one of the special and comprehensive areas of industrial design. Designing and producing products suitable for the versatile development needs and changing interests continually of children, which are considered as a special user group, are among the primary issues of the toy industry. Therefore, it is important for the industrial designer to search and to understand the nature of the user, her/his interests, usage and/or consumption trends in a truthful and efficient way. In this regard, the field datum of the different research and implication areas that deal with the child and childhood themes from various aspects can often be a guide for industrial designers. In addition, it is seen that the implication in question and research areas also examine toy design for their own research. In this respect, it can be said that toy design is an interdisciplinary field as in the rest of industrial design.

Toys, whose positive effects on child development, are known to everyone, are classified in various conceptual relationships such as the “place and purpose of use”, “age of use” and “user gender”. In this classification, the design of aquatic toys, named by various names such as “sea/pool/beach or water toys”, constitutes the basis of this research as an almost untouched area.

As a note on the use of terminology, unless any quotes are mentioned, the phrase of “water -or sea- toys” will hereinafter be called “aquatic toys” to ensure integrity of meaning and usage. Although the adjective “sucul” in Turkish is not a prevalent expression for an object such as a toy, it is one of the exact equivalents of the English term “aquatic” in the dictionary (Bezmez and Brown, 2013:19). Also, it is seen that the expression “aquatic toys” is mostly used for water toys in foreign literature scans, for instance in English sources. Although the term “water toys” is used for the whole of sea, pool or bath toys in Turkish, the phrase “aquatic toy” was deliberately preferred for this study in order to comply with the English translation as much as possible.

1.1. Definition of the Problem

When used in their customary form, it can be said that PE (polyethylene) pool noodles exhibit monotype and therefore mediocre usage properties. The main subject emphasized by this study is the investigation of the potential of PE pool noodle to be an alternative, useful and improvable structural component for the design proposal of an aquatic toy suitable for industrial production.

In addition, the fact that today's children who are in their developmental period do less physical activity than recommended is considered as a problem in terms of their physical (muscle and movement) development called "motor performance". Accordingly, today's children adopt a more sedentary lifestyle as their age progresses, as in most adults. Therefore, it has been recommended that children undergo a physically active development period in order to become healthy individuals in the future (Özüdoğru, 2009). In a sense, this problem is also one of the factors taken into account in the emergence of the design idea of the aquatic toy proposal that is the subject of the study.

1.2. Aim of the Study

The primary purpose of this study is to re-evaluate the usual usage functions of pool noodles, known as a polyethylene foam based product, for the design proposal of an aquatic toy which is expected to provide new industrial added values. In this way, the idea of bringing a new alternative to inflatable aquatic toys is the starting point of the study, in an effort to produce a simple and industrially viable prototype (at least a small scale model or mock-up trial) that does not require advanced engineering solutions.

On the way to reaching this basic goal, some of the sub-research subjects that are expected to support the study will be:

- It is aimed to examine the development of aquatic toys in the process and to reach references that can be the starting point for the concept generation. In this context, it is aimed to give a general review of some examples such as reed boats, native canoes, and various iconic antique boat types produced by various cultures with traditional methods and materials.

- Examining the structural properties of PE pool noodles is another sub-purpose. As a result of this, it is aimed to compare the advantages and disadvantages of PVC (polyvinyl chloride) -based “inflatable aquatic toys” and PE pool noodles, which come to mind first and more frequently in the concept of aquatic toys.
- In the light of the data to be obtained, the last sub-purpose is to exemplify the general principles and/or process of toy design with the prototype of the study and various evaluations of it, by following a deductive approach.

Finally, to mention the purpose for the benefit of the user; it can be seen that today, children spend most of their time in closed environments such as home, school, malls (İşmen Gazioğlu and Kılıçaslan Çelikkol, 2012:50) and do not sufficiently participate in physical activities, which are among the most important activities of their development periods (Özüdoğru, 2009:1,5,43). Our toy, which is proposed as a sample in the study, aims to overcome these shortcomings of the children by making them love water, sun and sand more. In this way, it is hoped to contribute to the socialization of children and to develop their physical, cognitive and mental competencies in a more effective and fun way. Again thus, children at the age of starting individual and/or team sports can gain some simple technical skills for water sports like sailing, rafting, rowing and for maritime professions, by directly doing some trials on water. For instance, they can take their first steps in learning to manage a simple watercraft such as canoe, zodiac boat, raft or small sailboat. This also may offer children various career and/or hobby options for their adult life in the future.

1.3. Research Questions

- What are the key success factors of a rideable aquatic toy design?
- Could PE pool noodles be suitable/useful structural components in the design of a physically stable carrier aquatic toy, apart from their habitual usage?
- What are the advantages and disadvantages of aquatic toys made of PE pool noodles against inflatable PVC toys?
- What could be the conceptual starting points for the design of an aquatic toy where PE pool noodles are the main components?

1.4. Structure of the Study

The study consists of six main parts. In the first chapter, there is a brief introduction of the subject, its purpose and structure. In the second chapter, “Literature Review”, the information infrastructure used while sampling the design process of our toy proposal was tried to be consisted by compiling the data from various fields of expertise. In the third chapter, “Methodology”, the methods and processes of the study are introduced. The fourth chapter, “Case Study”, is the section where the design process of our aquatic toy proposal is sampled as the thesis project. The fifth chapter is the “Findings” section, where the results from the fieldwork are given. In the sixth chapter, it has been tried to evaluate the results reached throughout the study.

CHAPTER 2

LITERATURE REVIEW

2.1. Play, Toy and Child in Terms of Industrial Design

As a general approach, it is seen that the researches on the concept of toys in various specialties started mostly with the emphasis on the place and importance of the play and toy in child development because -unless a different user profile is mentioned-, the child is the first and most characteristic toy user that comes to mind, and there is a rich diversity of interactions between the child and the toy. This rich diversity offers topics worth exploring for various reasons for many research and application areas. According to a quote by Begiç in her work, toys are both play tools and indispensable objects of the childhood period, which is considered the most productive stage of an individual's personal gains. In this sense, it is seen that while toys are a reference to the social history of childhood on the one hand, they are also a resource for science, technology, culture, art and educational history researches (Yalçinkaya, 2002:98 cited in Begiç, 2016:221).

Due to its structural features and wide range of work areas, industrial product design also benefits from a wide range of theoretical and practical work areas. From this point of view, it can be said that industrial design, which is one of the leading research and application fields, exhibits multidisciplinary and interdisciplinary features.

The Industrial Designers Society of America (IDSA) defines industrial design as “the professional service of creating and developing concepts and specifications that optimize the function, value, and appearance of products and systems for the mutual benefit of both user and manufacturer” (Ulrich and Eppinger, 2000:212). Bayazıt (2011) states that industrial design is related to three-dimensional objects that are produced in large numbers in the industry and used by people and generally require creativity and innovation, and transfers ICSID's (International Council of Societies of Industrial Design) definition of industrial design as follows: “Design is a creative act and its purpose is to consider objects, processes, services and their systems in all life cycles (...)” (Bayazıt, 2011:13).

Industrial design generally addresses the issue of toy design on the “product and human interaction” axis. The play activity can be described as the most characteristic example of this interaction as well: product (toy)+human (child) = interaction (play). As in other areas of industrial product design, the correct understanding of user/product interaction also in toy design is one of the important factors in determining pre-production road maps. In this way, it will be possible to reduce all kinds of production and marketing expenses and to provide customer satisfaction in general by responding to the demand with the most suitable products. Thus, double-sided benefits can also be obtained.

When the user group mentioned is kids, it is mostly inevitable that designers have insufficiencies in understanding children’s wishes and needs, because it is known that kids, especially smaller ones, often cannot express themselves clearly. According to Zhang and Peng (2010), often using their own childhood experiences or previous knowledge when designing toys means that designers may overlook children’s constantly and rapidly updated individual needs. Sometimes, because the companies manipulate the appropriate user age range with commercial concerns, indirectly, the appropriate toy needs of the children are not met (Zhang and Peng, 2010:1179). Similarly, Lv and Peng (2010) emphasize that the inner experiences and psychological changes of children, which they define as a special user group, exhibit more uncertainty than adults. Accordingly, toy design requires different methods and/or approaches than other product designs. For this reason, it is recommended that toy designers try to determine the mental, physiological and environmental factors that affect children’s toy selections in the most effective and clear way by conducting comprehensive analyzes and in-depth studies in order to make successful toy designs (Lv and Peng, 2010:946). With a similar approach, Güntürkün (2009) defines toy design as a different design area with its own knowledge, rules and obligations by mentioning the decisiveness of factors such as children’s age groups and their ergonomic needs in toy design. Therefore, this areal originality causes toy designers to approach toy design differently from general product design (Güntürkün, 2009:14). The factors like these cause industrial designers to search for solutions of their own design problems within other countless specialties, such pedagogics, material sciences, sociology, history, arts and crafts etc.

In this part of the study, it will be tried to make some definitions and classifications on the concepts of child, play and toy and to understand the interactions between concepts by including the information of different specialties.

2.1.1. Who is a Child?

The definitions and classifications for “child concept” and “childhood phenomenon” show similarities or differences according to different cultures and topics covered. Nevertheless, the common point of any definition and/or classification that can be made is inevitably and characteristically based on the age factor.

Childhood age is a period worth examining in many ways. Because childhood is a kind of “groundbreaking” period that covers the first periods of an individual’s life. The individual, who is described as a “child” in this period, needs a special approach and help in all areas of spiritual, physical and social development. Although s/he does not have many personal and social competencies yet, s/he has gradually started to gain experience to obtain these competencies. Plays and toys are perhaps the most prominent assistants in this process of getting experience (see also: İşmen Gazioğlu and Kılıçaslan Çelikkol, 2012).

The definition of “child” in the encyclopedic sense is most simply defined as “girl or boy before adolescence” (“Çocuk”, 1986). According to Büyük Larousse, the childhood period from the birth of the individual to adolescence can be divided into four sub-periods in itself: the newborn period (about the first 1 month), infancy (up to the 18th month), the first childhood (6-7 years until), the second childhood (until adolescence). Some sources consider the age of 14 as an upper limit for childhood in terms of development. This is due to the fact that the age of 14 is considered to be approximately the “end of last childhood” and “the beginning of preadolescence”: “Preadolescence is the period when gender skills are acquired. It occurs at about 12-13 years of age in girls and at about 13-14 years of age in boys and continues for 2-4 years.” (İşmen Gazioğlu and Kılıçaslan Çelikkol, 2012:94). The period named as “last childhood”, “second childhood”, “before adolescence” or “school/primary school period” is given as 6-12 years old in some sources (Polat, 2018) and 7-11 years old in others (ÇADEM, 2015). Similarly, Coelho and Fernandes (2013), while talking about the stages of child development in their article titled “Toy Design: A Methodological Perspective”, define childhood as “the part of human life that begins at birth and reaches the age of 12” (Coelho and Fernandes, 2013). In summary, it can be said that various sources in the literature have classified the specified age ranges by expanding or narrowing them by one or two years and using more various names.

On the other hand, laws and regulations are some of the sources that make the definition of child most clearly according to the age factor. Laws prepared for children in Türkiye define the child as follows: “(...) Even though more mature at an early age, persons under eighteen years of age (...)” (TC Aile Çalışma ve Sosyal Hizmetler Bakanlığı, 2005). According to Turkish laws, 18-year-olds are considered to be of age. So legally, an 18-year-old individual is no longer a child. S/he has some citizenship rights in legal/social sense and it now directly undertakes all kinds of responsibility for her/his own actions in legal/social terms. On the other hand, there are studies that take the age of 18 as an upper limit in also pedagogical sense: Neyzi et al. (2008), in their study evaluating the physical development criteria of Turkish children, frequently categorize children as 0-5 and 6-18 age groups (Neyzi et al., 2008).

It is understood that the age of 14 is accepted as an upper limit for childhood, according to the domestic and foreign regulations published on toys in general (see: 2.2.4.1. Determining the Age Range for the Target Audience).

2.1.2. Play and Toy in Child Development

The concepts of “play” and “toy” have been one of the study areas of pedagogy since its early days. The fact that play and toys are important tools for child education and development is regarded as a general acceptance subject that pedagogues and educational scientists, and even some philosophers and scientists agree on, regardless of any school. Some of the important examples that stand out with their theoretical views on the importance of play and toys in child development are names such as Maria Montessori (1870-1952), Jean Piaget (1896-1980), Lev Vygotsky (1896-1934) ve Johan Huizinga (1872-1945). In various studies on the relation of child development and education with games and toys, it is seen that the opinions of these names and many others on the subject are frequently used (see also: Bolışık et al., 2014; Dilci and Arslan, 2017; Egemen, Yılmaz, and Akil, 2004; Kadim, 2019; Pehlivan, 2016). In this respect, as a general opinion, it can be said that play and toys, and play tools, support the child during her/his cognitive, linguistic, emotional, social and physical development journey and prepare her/him for her/his future life in various ways. People have gained most of their experiences on various topics since childhood, most effectively by playing games.

This is an attitude that can often be observed in other animals ("Oyun", 1986; Huizinga, 2006). As it is known, infancy and childhood are the periods when the foundations of human physical, mental and social development are laid. Considering that learning by doing, trying, imitating, is the most basic methods in personal, physical and cognitive development, it is seen that the play environment is the most natural environment in which gains based on these are obtained. Therefore, the play is a kind of active learning process or method and in this context, play based methods are used also in education (Pehlivan, 2016). Also an entertaining play/game is one of the most preferred and the most effective ways of learning and gaining experience for children, even adults in some situations.

The studies conducted reveal that the game is important in a child's life with its healing, improving and instructive aspects. However, it is known that play has positive effects not only in childhood but also in adolescence and adulthood when considered in the long term. Researchers determined that children who had enough toys and had the opportunity to play from their childhood had more positive social-emotional development and increased school success. Similar results apply to adults who are called 'playful'. It is known that especially playful adults have better emotional well-being. For this reason, it is necessary to consider the game as an important element not only for children but also for adults (Aydoğdu, Sönmez, and Aslan, 2016:5).

In this sense, compulsory simulation trainings received by some professionals such as pilots, astronauts, F1 drivers can also be considered as a kind of learning through the game (or play). Still, the concept of play is primarily and generally associated with the childhood period (Bener, 2016:11).

Although there are various exceptions, plays and toys can generally be classified by taking into account variables such as the age of the child, her/his gender, interests/abilities and places where the toy is used. Looking at the various uses in daily language, it is also possible to expand this classification by considering the intended use of play/games and toys and their affecting mechanism: "educational-instructive, developing and/or creative play/games and toys", "strategy play/games and toys", "entertaining play/games and toys" etc.

Conceptually, the toy can be defined as the assistant/tool of the play, in the simplest (Bolişik et al., 2014:978; Egemen et al., 2004:39,40). A more comprehensive toy description, including also its functions, is made as follows:

All play material, which brings order to the movements of the child, helps the mind, body and social development, develops imagination and creative abilities during the development stages, is defined as a toy. Empty matchbox, reel, pieces of fabric, etc. waste products and natural play materials such as water, clay, sand also fall into the scope of the toy.

Toys are play materials that facilitate the natural abilities of the child and thus serve as an educational function. Also the toys, which develop a sense of selection and evaluation in the child, enable the child to make self-decisions and gain skills in a certain area with these functions.

Again, toys can be viewed as tools that regulate the individual's relations with society and the environment.

Toys help children to grasp various colors, sizes and shapes, and to be aware of numerical concepts. Toys are necessary for all children of different ages and mind levels (Ömeroğlu, 1997:24).

However, it is seen that this definition does not discriminate between “toy” and “play object” in the conceptual and technical sense. First of all, it should not be forgotten that all toys are already direct play tools in terms of their main functions and/or reasons for their existence. However, materials such as water, sand, clay, play dough that can be used as a play tool (or play object/material); pickup objects such as waste rolls and packaging boxes, reels, buttons, branches and bone fragments or items of daily use should not be considered “toys” in technical aspect. A toy is, above all, a targeted/planned design product that is produced directly for use in the play and is expected to comply with some technical, cultural, etc. standards. Whether the construction techniques are based on traditional handcraft and the simple assembly and shaping of junk or found materials, or the use of state-of-the-art materials and complex manufacturing techniques, the outcome product is the result of a physical and targeted transformation. On the other hand, a pot lid for example is mainly made for a daily routine like cooking. However, thanks to the creative imagination of a child, it can become a substitute “play tool” by turning into a shield in a war game and a steering wheel of a racing car in another. With a similar approach, Ak (2006) transfers that play objects can be created especially for the play, as well as from some objects used for other purposes. Accordingly, play objects are items that the player can perform the play using these objects or the player builds the play directly on these objects (Ketchum, 1981 cited in Ak, 2006:26). Even so, it can be appreciated that this transformation given in the example above is only conceptual or fictional. In this regard, the only common aspect of a toy and a play tool/object is that they are auxiliary elements that start or continue a play. In addition, the use of any product for play that is not intended as a toy can in many cases even be dangerous for children.

Onur (2010), on the other hand, deals with the distinction between toys and play objects with a similar view, emphasizing the autonomous nature of the toy: “(...) The toy is individual, independent of the play, and can exist on its own. However, the play object can only exist within the play, so it is used in common, not individually (...)” (Onur, 2010:28,29).

As mentioned before, it is also possible to classify the toys according to the place they are used, and this distinction is generally made as “indoor and outdoor toys”. Although there are some exceptions, “aquatic toys”, which constitute the main subject of the thesis, can be characterized as toys that are mostly used outdoors in such a classification. For example, according to the literature, toys such as plastic bath ducks and small toy ships, which can be used both indoors and outdoors due to their size suitable for hand-held play, are classified as aquatic toys in terms of their usage characteristics. However, it is aimed that the prototype proposal, in which some design processes will be exemplified in our study, will be a carrier aquatic toy in terms of its usage features and physical dimensions. Therefore, these types of toys are mostly used outdoors, with exceptions such as indoor pools. For these reasons, small floating toys mentioned will be included in our study by name only as a subgroup of the aquatic toys category (see also: 2.2.3. Rideable Aquatic Toys (RAT): Definitions and History).

2.2. Toy Design and Rideable Aquatic Toys (RAT)

It is seen that the concepts of “play” and “toy” in domestic and foreign literature are the subject of research within the scope of many fields of expertise, from pedagogy to folklore, from archeology to fine arts, from trade to industrial design. In this context, it is possible to come across many studies on various but previously studied subjects such as “educational toys”, “age and gender appropriate toys”, “the importance of toys in child development”, “toy history”. In short, it can be said that the field of research on toys revolves around a few specific topics, mainly those that are popularized by current trends, based on the literature review conducted. Nevertheless, this should not mean that no original work has been done on “toy design” or in a broader sense “toys”.

Among these fields mentioned above, industrial design and the fine arts disciplines that support it also deal with the issue of play and toys from various perspectives. Again, “Toy design” is also one of the most prominent issues among

these, with its various aspects. However, as can be seen as a result of literature reviews, especially the design of aquatic toys seems to be an area that has hardly been dealt with as an academic study. The overall resources we can access in this area do not go beyond the websites of commercial organizations or some patent documents, mostly from the 1900s, and eventually various regulations on toy safety. For this reason, making some compilations on the subject from different study areas will constitute the basic information infrastructure to exemplify the design process of a rideable aquatic toy proposal. However, before this, trying to define the phenomenon of design in general and mentioning some design-oriented approaches may be suggestive for the establishment of the mentioned informational infrastructure.

2.2.1. Design Phenomenon and Some Design-Driven Approaches

Today, it is known that some modern design approaches and/or understandings are adopted in the development of new products or services in industry (and in the toy industry, which is a branch of it), like many other fields where design phenomenon is involved. It is seen that researchers who examine the features and processes of these approaches or understandings, which are generally described as “design-driven”, they start by trying to define the phenomenon of design firstly.

When the conceptual definitions made on the phenomenon of design are examined, it is understood that design is often regarded as the process of transforming an abstract product (idea) fictionalized as a result of mental activity into a physical product or service. There are also opinions that define design as a form of problem identification and solving method.

The word “design” is defined in the narrowest sense in the dictionary as “forming, constructing something in mind” and “designed form” (“Tasarım”, 1986). On the other hand, Bayazıt (2011) defines the design phenomenon as “(...) the creative action of problem determination and problem solving which consists of decisions made to achieve the goals in its various stages” (Bayazıt, 2011:16). Akdemir (2017), in her work, which she qualifies as a “compilation on design-oriented approaches”, argues that it is important to consider the word meaning and content of design from a broad perspective in terms of perceiving the basis of design-oriented approaches. According to Akdemir, design phenomenon exhibits a conceptual and areal expansion and complexity

with the developing world. Accordingly, it can be said that this expansion and complexity is mostly due to the integration of the “design” concept with other closely related concepts such as “idea”, “mind”, “product”, “innovation”, “creativity”. For this reason, Akdemir mentions the difficulty of specifying the clear and precise boundaries of the word of design, which has numerous indications. According to Akdemir, when the concept of design is used as a name, it indicates what “the user perceives as a product or service”. On the other hand, when the act of design is mentioned, “the process by which the designer creates this perception” is understood. According to Akdemir’s quotation from Erengezgin (1998), the act of design refers to a formal vitalization created in the mind, and this process carried out at the mental level has two main phases: the development phase in the mind and its reflection on the outside world. Akdemir also states that design can be thought of as “the result of the ability to think of something that does not yet exist” (Akdemir, 2017:85,86).

Ulrich and Eppinger (2000) describe design as one of the three key functions of product development projects. According to this: “The design function plays the lead role in defining the physical form of the product to best meet customer needs. In this context, the design function includes engineering design (mechanical, electrical, software, etc.) and industrial design (aesthetics, ergonomics, user interfaces)” (Ulrich and Eppinger, 2000:4).

It is possible to list some design-oriented approaches or theories introduced by Akdemir in her work as “Participatory Design”, “Design-Driven Innovation”, “User Centered Design” and “Design Thinking”. When we examine these approaches, it is understood that some of them attach more importance to technological development and innovation concepts, some to the determination of user and/or human needs, and some to participatory processes for design. On the other hand, it can be said that some design approaches have similar aspects. According to Akdemir, the Design Thinking approach differs somewhat from other design approaches, especially since it is more related to the thought/idea dimension of design. Accordingly, the Design Thinking approach treats the concept of design as a system of thinking beyond being an object. In this approach, the idea of finding design-oriented solutions to events and/or situations is dominant (Akdemir, 2017:88,89). Efeoğlu et al. (2014) state that the Design Thinking approach is methodically compatible with other approaches, such as “open innovation” and “user-oriented innovation”, and even supports them (Efeoğlu et al., 2014:241).

It is seen in the literature that the Design Thinking approach is mostly associated with Tim Brown, the founding CEO of IDEO Design Company. Brown (2008) bases the origin of the Design Thinking approach on the working methods of Thomas Edison, whom he describes as a “generalist” who successfully blends many disciplines and specialties, beyond being a well-known inventor. “Innovation”, which is described as “a hard work” according to Brown, has become a profession thanks to Edison’s blending of art, craft, science, business knowledge with an intelligent understanding of customers/consumers and markets based on comprehensive observations. Accordingly, also the basis of the Design Thinking approach is based on this in summary:

Edison’s approach was an early example of what is now called ‘design thinking’ -a methodology that imbues the full spectrum of innovation activities with a human-centered design ethos. By this I mean that innovation is powered by a thorough understanding, through direct observation, of what people want and need in their lives and what they like or dislike about the way particular products are made, packaged, marketed, sold, and supported (Brown, 2008:1).

Brown defines the Design Thinking approach briefly as “(...) a discipline that uses the designer’s sensibility and methods to match people’s needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity” (Brown, 2008:1,2). Again, according to Brown, every design project should go through three basic stages, namely “inspiration”, “ideation” and “implementation”. “Identifying problems and opportunities” as the conditions that motivate the search for solutions constitute the content of the “inspiration” phase. The processes of generating, developing and testing ideas that can lead to solutions are the subjects of the “idea” phase. Finally, the steps that Brown describes as “the chart of the way to the market” are included under the general heading “implementation”. Accordingly, as project ideas are refined and evolved in new directions, it is possible that there are frequent returns, especially in the first two of these three basic stages. Therefore, it can be also said that Design Thinking is a set of methods based on multiple iterations and thus cyclical: “(...) the result of hard work augmented by a creative human-centered discovery process and followed by iterative cycles of prototyping, testing, and refinement (...)” (Brown, 2008:4). In their “Research Methods for Product Design”, Milton and Rodgers (2013) list the steps of an iterative design research process that is also adopted by various versions of the Design Thinking approach as follows: “Looking”, “Learning”, “Asking”, “Modeling/Prototype Making”, “Testing”,

“Evaluating and Selecting”, “Communicating”. According to Milton and Rodgers, these steps are iteratively intertwined in processes summarized as “Opportunity Identification”, “Brief and Specification” (Identifying Customer Needs/Product Specifications), “Concept Design”, “Design Development”, “Detail Design” and “Production” (Milton and Rodgers, 2013:14; see also:176,177). Mueller-Roterberg (2018) summarizes the stages of Design Thinking as “Understand“ (Understanding the Problem), “Observe”, “Point-of-View” (Define the problem), “Ideate” (Finding and selecting ideas), “Prototype” (Develop the prototype) and “Test”. The first three of them are called “problem areas”, the others “solution areas”. Accordingly, Mueller-Roterberg considers the “Actual Implementation” stage as a later stage where the design idea will be developed as a marketable product/service (Mueller-Roterberg, 2018:5,6).

On the other hand, it is known that there are versions of Design Thinking that differ more or less in subjects such as naming, sequencing, following linear or cyclic processes, defining different success factors, due to the interpretive differences of various opinions adopting this approach. Even so, “human-centricity”, “collaboration & teamwork”, “interdisciplinary teams”, “ideation & experimentation”, “timeboxing” can be listed as general features of the Design Thinking approach (Efeoğlu et al., 2014:250-252).

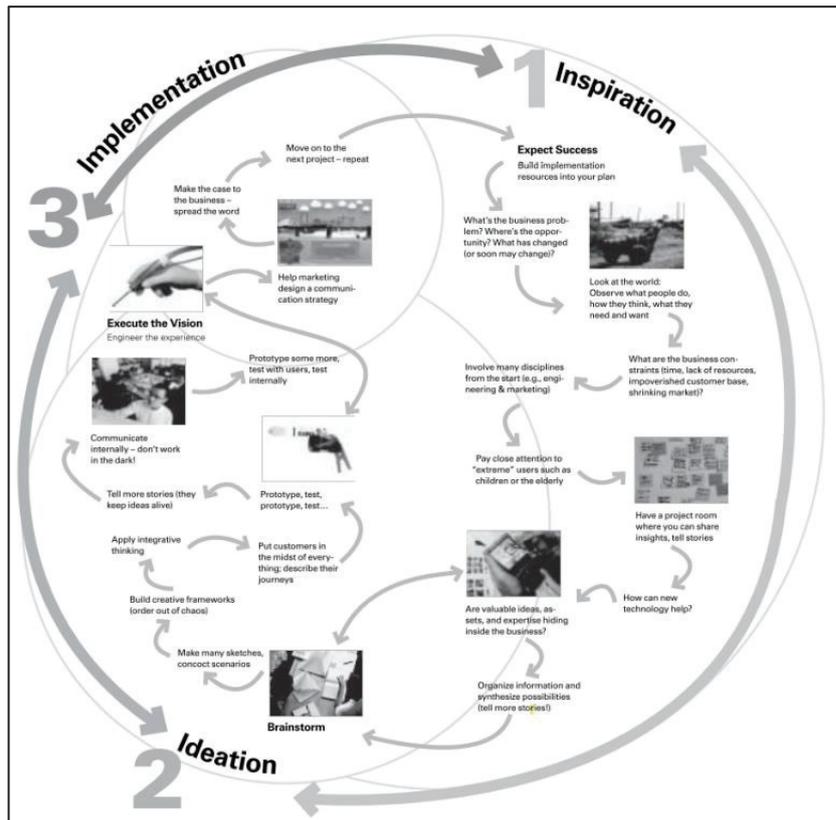


Figure 1. "Tim Brown's Design Thinking Approach"

(Source: Brown, 2008:5)

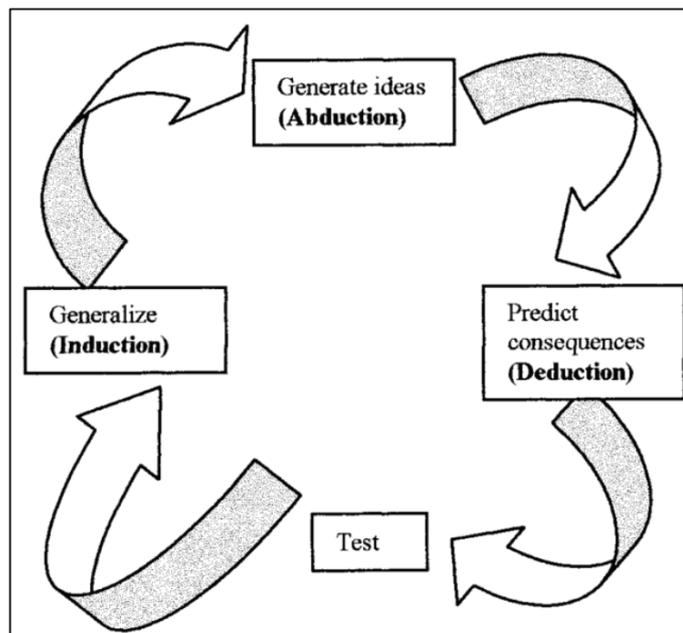


Figure 2. "The Cycle of Design Thinking"

(Source: Martin and Dunne, 2006:518)

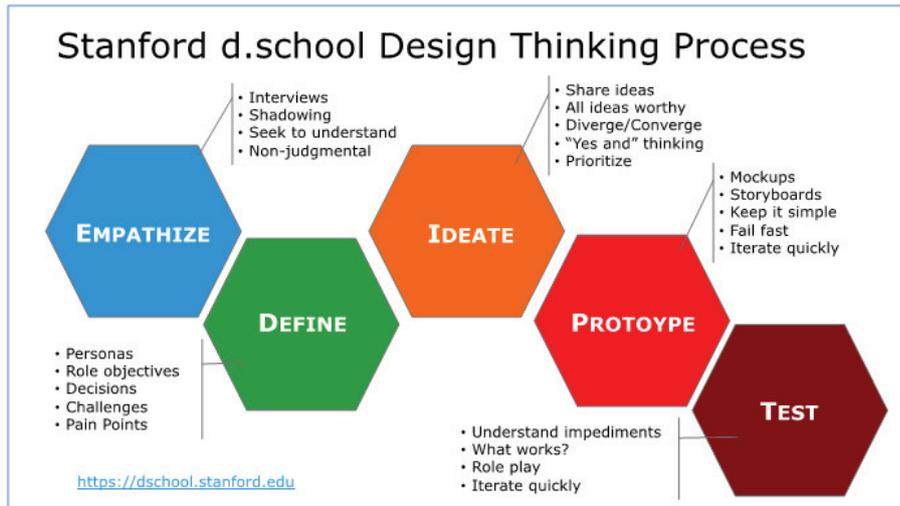


Figure 3. "Stanford d.school Design Thinking Process"

(Source: URL-1)

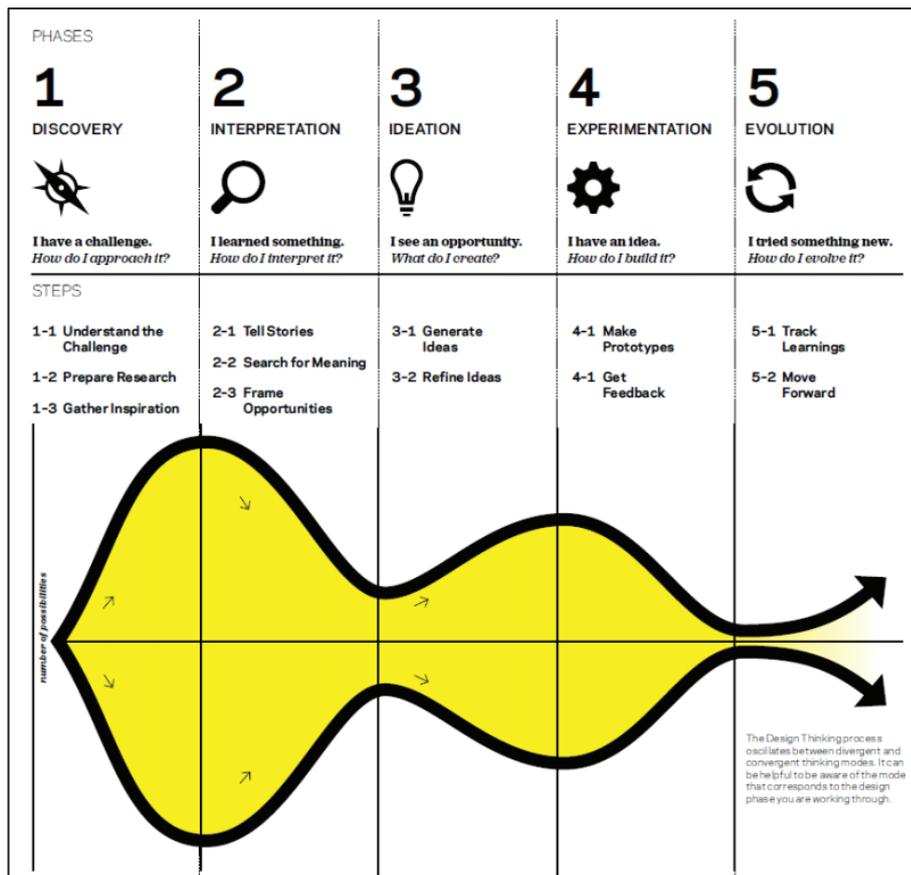


Figure 4. "Design Thinking Process for Educators"

(Source: Riverdale and IDEO, 2012:15)

2.2.2. An Overview of the Toy Design

The origin of toys is as old as the history of humanity. Therefore, it can be said that the history of toy making is also very old. Numerous ancient toys made of various materials and belonging to different cultures and ages are exhibited in many domestic and foreign museums (see also: Bener, 2016; Onur, 2010).

From ancient times until the end of the Middle Ages, it is known that manual labor rather than machine-weighted mass production was used in toy manufacturing with limited material and technological production possibilities. From this point of view, it is understood that toy production is far from being an industrial business as we know it today in terms of production volume in this process. Also, most probably the making processes were taking a long time for each toy. Thus, their costs should have increased. So the custom made toys were not some products that were easily reachable for every child. *Büyük Larousse Sözlük ve Ansiklopedisi* (1986) states that playing with custom made toys is a privilege for children who were the members of wealthy families from the Middle Ages to 18th century. Accordingly, the toy making business was being carried out by the guilds that belonged to jeweler, lantern manufacturer, comb manufacturer etc. Also, the toy sales business just belonged to haberdashery stores ("Oyuncak", 1986). According to the quote of Begiç (2016), who talks about the toy history of Anatolia, the toy-making skills that Turks brought from Central Asia in the 10th century have come to the present day by forming a common toy tradition with the Anatolian heritage, which already has a rich accumulation. It is known that this tradition was continued by small craftsmen during the Seljuk and Ottoman Empires (Begiç, 2016:222). Based on the literature reviews, it is possible to say that the history of toy manufacturing has followed a similar course in different geographies over time.

At this point, the quotations made by Bekir Onur (2010) from different sources in his book may indirectly explain why toy making was carried out by professions based on crafts in the past: "Toys are mostly made by adults to entertain children and generally reflect the adult life of the period in which they were made (...) However, toys should be seen as miniature syntheses of our world. (...)" (Onur, 2010:22,23). So much so that while various artisan groups, whose common point was to make production based on handcrafts, were making daily use products for the adult world, they could produce miniature versions of some of their products in toy sizes for children.

Especially in the periods when carvable materials such as wood and bone were frequently used in the production of everyday items, it is observed that toys were also produced thanks to the production methods based on “loss of parts” used in carpentry. With the use of materials such as clay, leather, textiles, and metal in toy production over time, it is understood that were also benefited from the skills of the other craftsmen who can process these materials (or parents who have hand-made skills). In addition, it is known that mechanics such as watchmakers play a role in the production of some mechanical toy types (Onur, 2010:77,78). Germany, the first country in Western society to transform a toy into an organized industrial product, is the first example that comes to mind: “(...) The first major toy makers in Europe originated in Northern Germany and these mostly centered around the watchmakers district of Bavaria (...)” (Onur, 2010:58).

In our country, “Traditional Eyüp Toys” can be given as one of the most prominent examples of toys produced with handcrafting methods (Fig. 5). According to the quote of Begiç (2016), toys produced as a separate business branch in Istanbul’s Eyüp district in the 17th century could meet a certain need. Nevertheless, the toys of the children living in the Anatolian provinces were usually made by the children themselves or their parents from ready-made materials (Özyeşer Cinel, 2006:34; Begiç, 2016:222). As a matter of fact, it can be observed that the same situation still continues for various reasons in today’s underdeveloped countries or in most rural areas.

It is a known fact that toy making continues as a traditional folk art in many cultures from past to present. Most of the time, it is seen that someone from the family, or directly children, make handmade toys from various materials with their own skills in every society. Also the transformation of this situation into an art tradition that lasts for generations is often a natural consequence which is often encountered. Among the well-known and more recent examples of this in our country, it is possible to count productions such as “Soğanlı Ornamental Dolls” (Kayseri), “Bozüyük Rag Dolls” (Muğla), which are named after our various regions (Fig. 6, Fig. 7). Although they have gained a commercial quality, it is seen that such production still continues with traditional methods in villages and non-formal education institutions such as public education centers. Today, these examples are considered as touristic commercial products and folkloric material culture carriers or collection objects. However, it can be said that such productions were used as children’s toys in the early stages and one of

their important functions was to prepare girls for future parenting roles through play (Begiç, 2016:222; Taşdemir, 2009:4).



Figure 5. Samples of the traditional Eyüp Toys

(Source: URL-2)



Figure 6. Traditional Soğanlı Ornamental Dolls (Kayseri)

(Source: URL-3)



Figure 7. Bozüyük Rag Dolls (Muğla)

(Source: URL-4)



Figure 8. Samples of the traditional hand-made Bogorodsk wooden toys

(Source: URL-5)

A characteristic group from abroad in the sense of exemplifying a traditional folk art consists of Russia's famous hand-made Bogorodsk (Bogorodskaya) wooden toys. It is known that the production of these toys, which generally have simple mechanisms and moving parts, continues today with the experiences of craftsmanship transferred from generation to generation (Fig. 8). As in these last examples, it should

not be wrong to put toy production based on handcraft partially into the industrial design class. One of the reasons for this can be explained by the fact that the products produced are the result of certain typological standards and certain standardized materials and production processes. In addition, in order to achieve this standardization, the need for new generation producers to undergo various mastership training and to learn certain design knowledge can be given as another reason.

Academician Avşar Gürpınar, who is also issuing the toy inventory of Türkiye, gives the example of Historical Eyüp Toys, mentioning briefly the situation of traditional handmade toy production in İstanbul in the pre-industrial period and its commercialization-industrialization process in an interview:

Toys made in a certain place with the materials found from around, that is, based entirely on local knowledge and forms, are already present all over the world (also in Anatolia) at every moment of history. Eyüp toymakers were the settled, commercialized and mass-produced version of this. Although it was in the pre-industrial period, what was in question was a production based on a master-apprentice relationship with some simple machines (...) (Şahinler Demir, 2020).

In another study, Gürpınar (2014) gives the following information about the manufacturing, sales and material supply conditions of Eyüp toy manufacturers at that time:

In the Eyüp toy market, the masters were producing their toys in the backside of their shops and selling them up in front. Eyüp was at a critical geographical location in the city in means of acquiring raw and discarded materials. The toymakers were getting their material from neighbouring districts (...) For example, Tahtakale was a centre of wooden goods and stove production, so discarded wood and tin was acquired from there. Wood and tin were the main materials for many models such as tops, cradles and mechanical toys. Excess leather and bowels were obtained from the slaughterhouse in Sütlüce. These materials were used mostly for music instruments. Also the clay that Kağıthane and Alibeyköy creeks were gathering was used in production, for toys like pitchers, moneyboxes and whistling jugs. This type of operation can be seen as an early example of sustainable production based on recycling. The proximity to the raw or excess materials made the process sustainable in means of production (Gürpınar, 2014:35).

Based on the information we have transferred so far, it can be said that those who dealt with toy production in the pre-industrial period were both the designers and manufacturers of the toys produced. Although examples of this case can still be encountered today on a small scale, industrial toy design and industrial toy production have become extensive areas of study in which the roles or responsibilities of all

stakeholders of the toy industry, especially designers and manufacturers, are specialized. Despite the separation of duties and responsibilities resulting from specialization, the need for strong communication between all stakeholders is still one of the most important elements for the efficient organization of the entire toy industry. Because of the nature of industrial production, different problems encountered in all processes carried out to reach a common goal will require different but interconnected expertise solutions. In this respect, although design and production are unique areas of application, they also assume roles that direct and support each other's functioning. In this sense, we can count other areas of expertise such as finance management, advertising and marketing, supply chain and transportation as other important components of the toy industry in terms of their roles/functions. Similarly, when Ulrich and Eppinger (2000) talk about product development in industrial design, they state that it is an interdisciplinary activity that requires the participation of almost all functions of a company. However, they argue that "Marketing", "Design" and "Manufacturing" functions are almost always central to product development projects:

Marketing: The marketing function mediates the interaction between the firm and its customers. Marketing often facilitates the identification of product opportunities, the definition of market segments, and the identification of customer needs. Marketing also typically arranges for communication between the firm and its customers, sets target prices, and oversees the launch and promotion of the product.

Design: The design function plays the lead role in defining the physical form of the product to best meet customer needs. In this context, the design function includes engineering design (mechanical, electrical, software, etc.) and industrial design (aesthetics, ergonomics, user interfaces).

Manufacturing: The manufacturing function is primarily responsible for designing and operating the production system in order to produce the product. Broadly defined, the manufacturing function also often includes purchasing, distribution, and installation. This collection of activities is sometimes called the supply chain (Ulrich and Eppinger, 2000:3,4).

In summary, although traditional methods still continue to be used in the production of some special handmade toys, it is seen that toy design and production is largely carried out by systematic and technological methods and processes. For this reason, it can be said that toy design and production have now commonly become the comprehensive branches of industrial design and manufacturing.

2.2.3. Rideable Aquatic Toys (RAT): Definitions and History

Although there is more to be said for other branches of toy design, it seems that we have much more limited material when it comes to aquatic toy design. Nevertheless, it is possible to make a classification for aquatic toys based on the data obtained from the literature review. Thanks to this classification, it can be more precisely understood what is included in the definition of aquatic toys and what is out of scope. In this respect, when it is necessary to make some technical definitions about aquatic toys, the regulations prepared on toys are the most decisive resources.

According to the “Guidance Document No.7: On The Application Of The Directive On The Safety Of Toys Toys Used In And On The Water” provisions (2014), some products used in water are listed as follows: “Bath toys”, “battery operated, remote controlled small toy ships”, “inflatable PVC toys” and “products designed to save lives”, “swimming aids and floating leisure articles”, “inflatable floating seats”, “swimming aids and instructional products such as inflatable armbands and jackets”. According to this directive, aquatic toys are toys that can carry/support a child in water and are intended for use in shallow water (European Commission Enterprise And Industry Directorate General, 2014:1; see also: The European Parliament And The Council Of The European Union, 2009:L170/7; European Commission, 2016:21). The International ISO 8124-1 Standards for toy safety (Toy Safety - Part 1: Safety Aspects Related to Mechanical and Physical Properties) define aquatic toys as “article, whether inflatable or not, intended to bear the mass of a child and used as an instrument of play in shallow water” (Technical Committee ISO/TC 181, 2009).

According to these regulations mentioned above, water equipment designed for use in deep water, swimming learning devices and buoyancy aids such as swimming seats and inflatable armbands for children are not considered as toys. It is also mentioned here that a size limitation of 120 cm is decisive for inflatable aquatic toys (and similarly for aquatic toys made of foam material). Accordingly, contrary to what is widely known, it is stated that aquatic products such as inflatable boats, sea beds and swimming rings with dimensions exceeding 120 cm are normally designed for use in deep water and therefore are not considered as aquatic toys.

As mentioned before, while doing written and visual scanning for the subject of aquatic toys’ design, many studies on practice can mostly be reached as commercial

patent documents. Other resources available are mostly personal “do-it-yourself” projects shared on the Internet. However, according to the results of the literature review made on “aquatic toys”, it can be said that the subject of “rideable aquatic toy design” is almost never covered as an academic research. In this case, it is possible to reach some assumptions and inferences by using the data of other specialties such as maritime and underwater archeology in order to investigate the emergence and development processes of the floatable carrier aquatic toys.

For the above reasons, we can assume that the history of the origins of rideable aquatic toys goes back to the early ages when transport on water began. When the literature on the development of ancient water transport and watercraft is examined, it is understood that an ordinary log is probably the first water vehicle of mankind. This is followed by the use of rafts consisting of several logs connected by a binder such as a rope or leather strap (Fig. 9). Overalls made of inflated animal skin, rafts as called “kelek” and placed over these overalls, basket-shaped boats called “quffa/kuphar” in Mesopotamia/Middle East (Yalçınkaya, 2016; Albayrak, Öz Kiriş, and Erol 2019; Wikipedia, "Kuphar", 2020b) (the different types of them are called “coracle” in the UK) (Wikipedia, "Coracle", 2020a), and wooden keel canoes covered with animal skin (Yenikapibatiklari.com, 2020), and boats made of aquatic plants such as lotus stalks, reeds or water canes are also primitive water vehicles that developed in this process (Erkurt, 2014; Yalçınkaya, 2016; Albayrak, Öz Kiriş, and Erol, 2019). It is known that even terracotta pots in which only one person can fit are used for primitive water transportation in Egypt and Greece in the Ancient Era. Accordingly, there are some Ancient Greek vase paintings depicting Heracles traveling on water in a large terracotta container (Yenikapibatiklari.com, 2020).

At the present day, it is now generally accepted that children learn life by imitating adult lives through play activities. This mode of learning was probably valid even in the early days of humanity, and given this, it is likely that some of the early watercraft mentioned above were used by children as well as adults in ancient times. Therefore, even in those ages, these vehicles might have also been transformed into play tools by children due to the nature of childhood. Based on this hypothesis, we can accept the children-sized ones among the mentioned primitive watercraft as the ancestors of aquatic toys as well.

The use of such primitive watercraft by children can still be seen today in some societies intertwined with water. The Uros lake community, known to have lived on

Lake Titicaca between Bolivia and Peru since the Inca Period, can be given as a current example in this regard (see also: Rigauer, 2013). In this community living on man-made stack islets, some children of school age can only go to school using small-sized boats made of local “Totora” type water cane because of their living conditions. Although some of these small boats made of reed look like toys in size, they can be described as means of transport that children often have to use alone, rather than being directly toys (Fig. 10). Nevertheless, reed boats, which are still in use in many different geographies such as Lake Titicaca, always have the potential to give an idea to the design of aquatic toys such as toy inflatable boats and toy canoes.



Figure 9. Illustrations depicting the developmental stages of primitive watercrafts
(Source: URL-6)



Figure 10. The Peruvian children in the boats made of Totora type reeds
(10A-Source: URL-7) (10B-Source: URL-8)

It may be possible to trace the origins of inflatable toys, which are the most common and well-known rideable aquatic toys today, at least in terms of their functional similarities, to the use of the above-mentioned inflated animal skins. At this

point, it can be said that the ancient people's idea of trapping air in a kind of membrane and turning this structure into a floating carrying device was an important technical discovery (Fig. 11, Fig. 12). Animal skins have also been used commonly in various aquatic societies as a covering material for a wooden canoe or boat frame, thanks to their fabric-like structure. As a result, the flexible, durable, lightweight and largely waterproof and airtight nature of the leather material are the main choices for both uses. However, due to its organic nature, it was inevitable that leather material would require constant maintenance and repair and eventually decompose. For this reason, it can be said that the coveralls made of animal skin used to trap air were gradually replaced by waterproof fabric membranes impregnated with materials such as oil, wax, organic resins, and then by today's inflatable toys with the discovery of elastic polymers.



Figure 11. Detail of a relief depicting some Assyrian soldiers crossing water using inflated animal skins

(The Palace of Ashurnasirpal II. (BC 883-859) at Nimrud, British Museum)
(Source: Casson, 2002:2 cited in Yalçinkaya, 2016:54)



Figure 12. Representative drawing of an Inuit native hunting on an inflated animal skin
 (Source: URL-9)

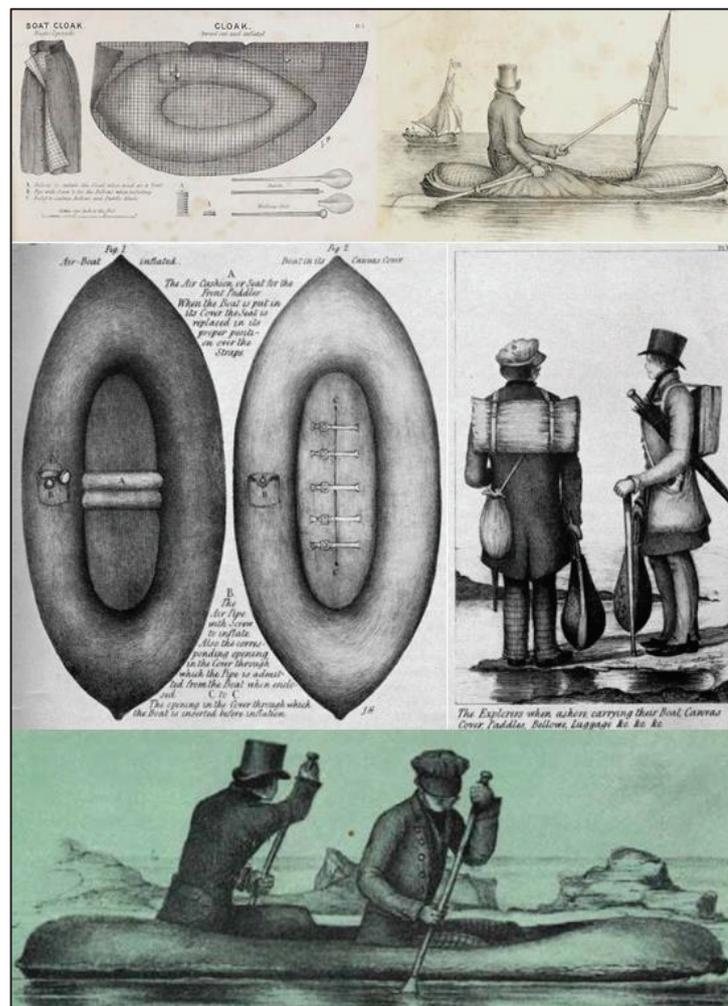


Figure 13. One and two seater versions of the Halkett Boat
 (Source: URL-10)

It is possible to give the earliest known date of inflatable aquatic products produced from industrial materials such as special textiles and plastics as we know them today, as the end of the 19th century. In this context, Halkett Boat, designed by Lt Peter Halkett (1820-1885) for military purposes as a multifunctional, compact survival kit in the 1840s, may at least be one of the first suggestive samples to investigate the development of inflatable aquatic toys (Fig. 13). Originally designed by Halkett for one person, this inflatable boat was made of rubber-impregnated fabric and when deflated, the hull of the boat could be folded and/or worn as a waterproof cloak. In addition, in this design, the paddle could be used as a walking stick and the sail as an umbrella. His second design was a two-person inflatable boat that, when deflated, could be folded into a backpack and used as a waterproof blanket this time. Nevertheless, Halkett's multifunctional inflatable boat prototypes are known to attract a very limited number of users and result in a commercial failure in general (Wikipedia, "Halkett Boat", 2020a). In summary, these two designs, although not achieving commercial success, can be considered as important first examples for modern industrial products that have similar design features to today's inflatable aquatic toys.

As mentioned earlier, it is observed that inflatable aquatic products such as swim armbands, swim rings, and sea beds are often described as aquatic toys in everyday speech, even if they are not classified as aquatic toys according to technical regulations. The most plausible reason for this should be that users often use such products as toys in their daily life, benefiting from their childhood experiences. In this way, as creative and pioneering alternatives in the development process of aquatic toys, it can become more understandable to use vegetative structures such as water gourd, which are dried and emptied instead of inflatable armbands, and tire inner tubes as the first swimming rings (Fig. 14, Fig. 15, Fig. 16). It can be said that the inflatable buoyancy equipment introduced by Draper (2019) as "water wings" is one of the first industrial productions with similar functions to inflatable armbands. It is known that water wings, which were produced under the name of "Swimeesy Buoys" by Dean's Rag Book Company of London in England in the early 1900s, got this name because of both their shape and the butterfly patterns drawn on some of them. Draper states that this product, which is used as a life-saver and swimming aid device, is made of heavy cotton textile and rubber and has a metal inflation valve in the middle of its two wings. According to Draper, it is also known that a similar product was produced under the name "Coxey's Life Saver and Water Wings" in the following years (Draper, 2019).

Today, with the help of determinants and/or variables such as popular culture and technological possibilities, products with almost endless visual forms and a wide variety of usage and production features can be produced in the design and production of inflatable aquatic toys. This also causes this type of products to be the most known and preferred products in the aquatic toy market. However, with the advancement of materials science, it is observed that PE foam materials can be alternative materials in the design of rideable aquatic toy varieties, thanks to their various forms and some advantages such as the buoyancy effect and structural strength they exhibit. Pool noodles, which are known to have emerged in the 1980s, can be shown as the most typical examples of this situation (see: 2.2.4.2.2. PE Foam Materials and PE Pool Noodles).



Figure 14. A simple nostalgic swim device, handcrafted from hollow gourds and a piece of rope

(Reproduction and photo by: Merter Yalçinkaya, March 2021)



Figure 15. Dean's Swimeesy Buoys, also known as "Water Wings", c. 1907 (Dean's Rag Book Co.)

(Source: URL-11)



Figure 16. An advertisement image in which an automobile inner tube is used as a swimming ring

(Source: URL-12)

THE HISTORY OF POOL TOYS

Pool toys have been a great source of entertainment in back yards for years, but how did our pool companions come to be? Find out below!

1940s RUBBER DUCK
This floating toy is based on a sculpture by Peter Gates, which was created in the 1940s, patented and reproduced.

early 1900s SWIM FLOATIES
These safety companions were created by the Dean's Rag Book Company in Britain to ease parents' concerns for their children's safety when swimming became part of the school curriculum.

1928 SWIM RING
This circular vessel was derived from the inner tube, which is the inner inflatable layer of older vehicle tires.

1950s INNER TUBING
According to Time Magazine, the recreational act of tubing was invented in Thailand by Princess Chumbhot of Nagai Sanga sometime in the middle of the 20th century.

1938 BEACH BALL
This ubiquitous inflatable toy was invented by Jonathan DeLange in California. The original beach balls were about the size of a hand and now come in various sizes and colors.

early 1980s POOL NOODLE
Steve Harrison, CEO and president of Industrial Thermal Polymers invented the pool noodle using bacher rod, which is a foam solvent used in construction.

late 1980s BANANA BOAT
This water sled was invented by Glenn Matthews in the late 1980s.

2010s PIZZA, MELONS AND SWANS
Oh my! Celebrities have popularized these enormous pool toy cousins, which come in all forms: donuts, pegasus, flamingos and more.

RISING SUN POOLS, INC.
Pools and Spas

Figure 17. “The History Of Pool Toys”

(Source: URL-13)

- **“Early 1900s Swim Floaties:** These safety companions were created by the Dean’s Rag Book Company in Britain to ease parents’ concerns for their children’s safety when swimming became part of the school curriculum.
- **1928 Swim Ring:** This circular vessel was derived from the inner tube, which is the inner inflatable layer of older vehicle tires.
- **1938 Beach Ball:** This ubiquitous inflatable toy was invented by Jonathon DeLonge in California. The original beach balls were about the size of a hand and now come in various sizes and colors.
- **1940s Rubber Duck:** This floating toy is based on a sculpture by Peter Ganine, which was created in the 1940s, patented and reproduced.
- **1950s Inner Tubing:** According to Time Magazine, the recreational act of tubing was invented in Thailand by Princess Chumbhot of Nagar Svarga some time in the middle of the 20th century.
- **Early 1980s Pool Noodle:** Steve Hartman, CEO and president of Industrial Thermal Polymers invented the pool noodle using backer rod, which is a foam sealant used in construction.
- **Late 1980s Banana Boat:** This water sled was invented by Glenn Matthews in the late 1980s.
- **2010s Pizza, Melons And Swans:** (...) Celebrities have popularized these enormous pool toy cousins, which come in all forms: donuts, pegasus, flamingos and more.” (see: Fig. 17)

2.2.4. RAT Design

In this section, the general initial steps of the industrial design process will be examined under various headings in order to illustrate the general process of industrial toy design through our aquatic toy proposal.

2.2.4.1. Determining the Age Range for the Target Audience

Toy design is one of the most specific research and implementation areas in the industrial design discipline. Due to the nature of its target group and today's fast consumption trends, the market's constant expectation for progress and innovation makes toy design interesting and necessary. However, as the lower age limit of the target audience gets smaller, it becomes difficult to understand the actual design requirements that fit the needs of the pedagogical developmental stages (Zhang and Peng 2010). In the design of products for children such as children's furniture, children's clothing and toys, it should not be forgotten that the anthropometric characteristics of children, such as height and weight, are different from adults, as another issue related to the age factor. This also requires finding different solutions to other design problems, particularly those related to ergonomics (see also: Li et al., 2009).

Considering all these factors mentioned above, the age range of child participants, one of our research groups, was determined as 5-14 years for online surveys conducted to find the real/suitable target audience of our toy proposal.

Determining the lower age limit as 5 years old is the result of the fact that children that are generally at this age have the ability to use a vehicle or toy such as a two wheeled bicycle that has a mechanism and requires ride, balance and movement coordination (İşmen Gazioğlu and Kılıçaslan Çelikkol, 2012:43; Pedagoji Derneği, 2012:5). Similarly, Budak (2016) counts tricycles and ride-on battery toys among the toys that can be used by children in this age group, in her study titled "The Examination of the Relationship Between 4-5 Year Olds' Toy Preferences and Play Skills" (Budak, 2016:28). Child development specialists and/or educators evaluate such tool or instrument usage skills that children develop over time under the title of "readiness". İşmen Gazioğlu and Kılıçaslan Çelikkol (2012) briefly explain this situation, which they count among the concepts related to the development of the individual, as follows: "In order for an individual to acquire a certain behavior, s/he should not only have a biological maturity, but also have the prior knowledge, skills, interest, attitude and health required by the behavior in question" (İşmen Gazioğlu and Kılıçaslan Çelikkol, 2012:11). This detail is important in the sense that it requires similar using capabilities if our toy proposal turns into a possible final product.

The main reason for determining the upper age limit as 14 years old in this study is that almost all of the domestic and foreign regulations prepared for toys are technically based on the age of 14. Accordingly, toys are defined as products or materials designed and manufactured for children under 14 years of age to play (see also: Technical Committee ISO/TC 181 2009; The European Parliament And The Council Of The European Union 2009; European Commission Enterprise And Industry Directorate General 2014; T.C. Gümrük ve Ticaret Bakanlığı 2016a; 2016b; OYDER 2017). However, when considering the standards of Türkiye, taking into account the changing height-weight ratios and standard body measurements, depending on the ages of the children, it may be necessary to reconsider the maximum age limit (see also App. E. for anthropometric developmental standards of Turkish children). In this respect, determining the age of 14 as the upper age limit for the use of our toy suggestion should not cause fundamental problems such as at least the user's inability to fit in the toy boat to be designed or inability to stay on the water because of her/his own weight (See also: 5.1. Findings of the Physical Usage Test).

On the other hand, it is a well-known fact that children's interests and likes change as they get older. As Egemen et al. (2004) stated, children begin to become more logical, realistic and social individuals in terms of their social, cognitive and emotional development after a certain age (given as over 12 in this study). As a result of this, their interest in the fantasy world around them begins to wane (Egemen, Yılmaz, and Akil, 2004:39). Looking at this situation, it is understood that this change in their interests and tastes may be an important factor in determining the degree to which children aged 12 and above prefer our toy proposal with a fantastic character design. In this respect, according to these available data and the results of the fieldwork that will be seen in the following sections, it may be necessary to lower the upper age limit for child users. Consequently, the age of 14 stated here is an upper age limit for participation in field research, at least at this stage.

2.2.4.2. Proper Materials for RAT Design

Today, various plastic derivatives are frequently and effectively used in aquatic toy design, as in other branches of industrial toy design, due to their different usage characteristics and production advantages. Although it is now widely accepted that the

use of plastic materials causes various biological and environmental hazards, the various structural, productional and economic advantages they provide explain why plastic materials are still one of the leading and preferred components of toy design.

PE and PVC, with their different forms, are just two of the most commonly used plastic groups in aquatic toy design. At this stage, the comparison of PE and PVC in terms of some material properties will be an enlightening start for our study.

Plastics consist of high molecular weight organic molecules or polymers. Polymers are more complex structures (polymer chains) where smaller molecules called “monomers” are repeatedly assembled in a specific sequence. This transformation process is called “polymerization”. PE and PVC are also included in the group of polymer plastics.

PE is a general name given to all polymers formed by ethylene with the closed formula $(\text{CH}_2\text{CH}_2)_n$ ("Polietilen", 1986). Accordingly, ethylenes in monomeric structure are polymerized by adding various additives that vary according to the intended use of the end product and by using different methods. Thus, PE polymer derivatives with different physical properties can be obtained (see also: Güler and Çobanoğlu, 1997; Polat, 2016; Yetgin and Ünal, 2008; Yakut, 2011). Foam-structured PE plastics used in the production of pool noodles, the target toy making material of our research, also form a part of this diversity.

Similarly, PVC is defined as the general name of vinyl chloride polymers. PVC's closed formula is known as $(\text{CH}_2\text{CHCl})_n$ ("Polivinilklorür", 1986). As with PE materials, a wide variety of PVC derivatives in different physical structures can be obtained by processing vinyl chloride, as a monomer, with other additives and various production methods (see also: Güler and Çobanoğlu, 1997; Ünver, 1998). In this sense, it is observed that in the production of inflatable aquatic toys, derivatives of PVC materials in the form of tarpaulin and/or a film layer that are water and gas-proof and have suitable flexibility, thickness and softness are generally used.

In addition to all these, the solidified forms of both PE and PVC can be widely used with various opacity-transparency, color and texture options in the production of toy parts that require a certain strength and hardness.

2.2.4.2.1. PVC Materials and Inflatable PVC Aquatic Toys

PVC materials in different forms with various physical properties are widely used in aquatic toy design, as is the case in general toy design. It is seen that the materials made of plastics in this group are produced in the form of an elastic membrane/layer that is impermeable to water and air, especially for the design of inflatable aquatic toys, thanks to various additives added to their structure (e.g. phthalates). Hard forms of PVC material, obtained by adding different additives, are generally used in the manufacture of carrier and/or binder parts of toys that require structural strength.

In addition to these additives mentioned, PVC materials offer a wide variety of color, opacity-transparency, hardness-softness-flexibility and texture options thanks to different production conditions and/or methods. Apart from its well-known disadvantages regarding health, PVC is still a popular toy raw material because it is a relatively economical material group suitable for many production methods such as molding, extrusion, and blowing film layer

2.2.4.2.2. PE Foam Materials and PE Pool Noodles

Polymeric foams are defined as “(...) polymeric materials with closed spaces (pores, cells) filled by air or any gas or containing gas dispersed in them” (Yakut, 2011:3).

In the production of polymeric foam materials, various production methods, which are generally characterized as mechanical, physical and chemical, are used. In this sense, the most widely used method is based on passing expansion gas through molten plastic derivatives to which appropriate additives are added, under certain temperature and pressure conditions. The main purpose for all production methods is to distribute the cellular structures that will form in the plastic foam as smoothly and homogeneously as possible. Extrusion method, which is one of them, is also widely used in the production of PE foam (Fig. 18):

(...) Extrusion method is used as the most suitable physical cell formation method in PE foam production. As all over the world, hydrocarbon gases are used as the basic expander material. These are basically propane, butane, pentane or their mixtures. It is inevitable to use these gases in terms of obtaining low density and insulation performance. Of course there are different gases used, but achieving the desired low density is much more difficult. (...)

In the PE foam production process, liquid gas is injected into the molten plastic, mixed under pressure and dissolved in the plastic. Hydrocarbon gas, which is in liquid state when the system is under pressure (inside the machine), turns into gas as it passes to a lower pressure environment (1 Atm) as soon as it leaves the extruder and at this moment creates pores in the structure. The expanded gas passes through the cell wall very quickly due to the internal pressure inside. This transition is completed when the cell internal pressure is balanced with the external pressure. This process of gas transition is very fast at the beginning, but slows down over time and is completed within 15-20 hours following production and the product becomes stable (Polat, 2016).

Polymer foams are divided into two groups as open and closed cell foams according to the cell structures they exhibit. Basically, passing an inflating or foaming gas and/or gas mixture through molten plastic at a specified temperature and pressure condition determines the porous cellular structure of the foam, the dimensions of the cells and the density of the final product. In this sense, it is also possible to classify polymer foams as “low density foams/LDF”, “medium density foams/MDF” and “high density foams/HDF” according to their densities. The types of plastic and gas used are also important in determining all these variables (see also: Yakut, 2011; El Khodor, 2020).

In the closed cell structure, there is almost no gas and liquid transition between the cells, thanks to the walls surrounding the pores. Thus, polymer foams in this cell structure can float on water. On the other hand, in the open cell structure, the cells are connected to each other by air spaces, as in natural and synthetic sponges. This situation causes open cell structured polymer foam materials to sink by absorbing water.

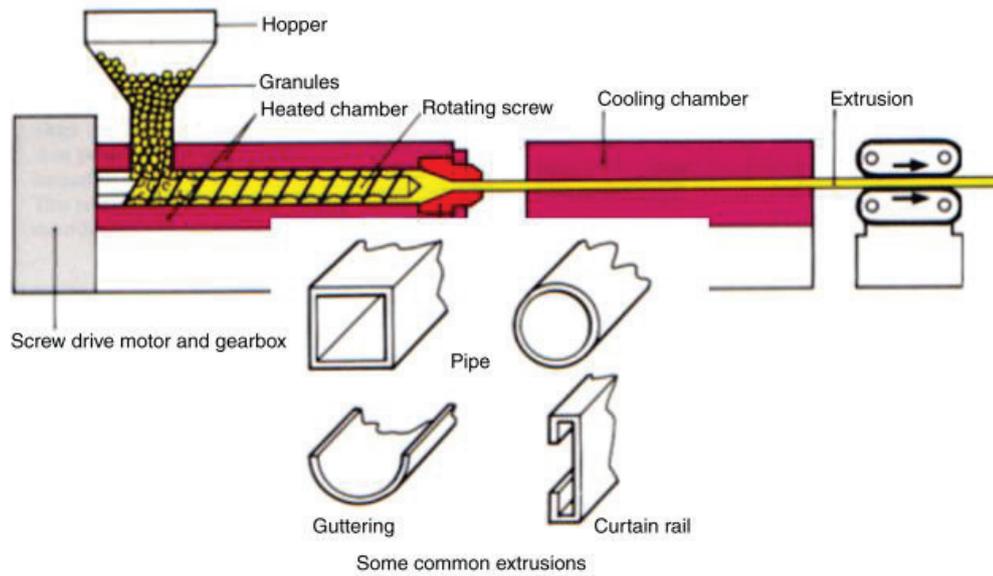


Figure 18. The scheme of a typical extrusion system and various molding profiles

(Source: URL-14)

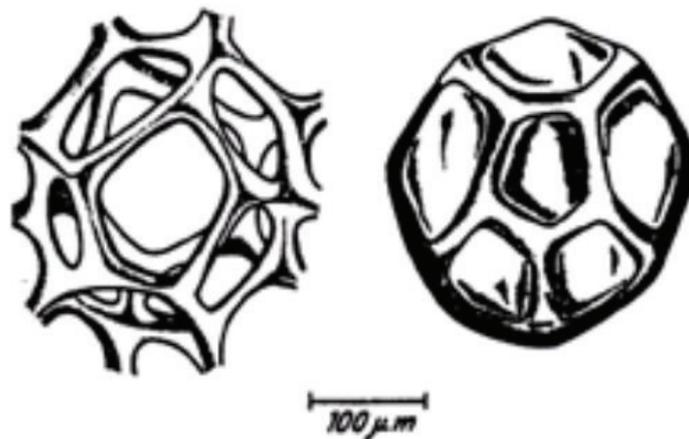


Figure 19. Open and closed cell structures

(Source: Yetgin and Ünal, 2008:120)

Pool noodles, which are determined as the main building material of our aquatic toys proposal, are also produced from materials classified as “low density and closed cell foams” group of PE. Therefore, their structural buoyancy makes pool noodles safe products for both children and adults, even when used individually.

2.2.4.2.2.1. A Brief History of PE Pool Noodles

During the literature review, we could not find any academic studies prepared directly on PE pool noodles. Therefore, it is possible to obtain some information about them only from corporate and commercial websites and/or from non-corporate personal websites, most of which include “do it yourself” projects. During these researches, it is also possible to come across aquatic toys made of inflatable materials that imitate pool noodles with their shapes. Although these samples are also introduced as pool noodles in commercial terms, the origin of pool noodles is based on polymer foam materials.

It is known that the idea of using PE pool noodles, which are used for several purposes today, as an aquatic toy first emerged in the early 1980s. However, who the idea originally belonged to is a matter of debate between two names from Canada since then: According to Steve Hartman, CEO and president of Industrial Thermal Polymers Company, at that time he and his father produced the product at their company in Toronto, Canada for the first time as a gray filler material called “backer rod” used in construction work. Accordingly, Steve Hartman later discovered the potential of this product as an aquatic toy through his own experience while having fun in the pool with his family. He produced it by coloring a batch to market the product as a toy (Ryssdal, 2014).

Around the same time (1986), Richard Koster, an entrepreneur from Ontario, Canada, claimed that it was his own idea that pool noodles, which he called “Water Woggle”, could be an aquatic toy. Koster tried to improve this product, which was previously plain white, by wrapping different colored belts and a snake-head shaped apparatus design (Pooltoyinventor.com, 2018).

As a result, it is known that both names did not take the patent rights of the product and many other companies produce and sell pool noodles today (Alex, 2014).

A typical pool noodle is a soft and highly bendable cylindrical product obtained by extruding molten PE material under certain temperature and pressure conditions from an extrusion machine with a generally circular cross section outlet. However, it is also possible to produce pool noodles in various appearances according to the cross-sectional shape of the mold connected to the outlet of the extruder. The polymerization process of the molten PE material continues during production. At the end of the production, product versions with various diameters, massive or with a smaller diameter

channel cavity in the center are obtained. Pool noodles are released to the market in various color options and generally in 5,5-7 cm diameter and 150-160 cm length sizes. However, within the technical possibilities, it is also possible for the manufacturers to produce in various sizes according to special customer orders.

2.2.4.2.2.2. Buoyancy Force of PE Pool Noodles

In addition to their softness and flexibility, PE pool noodles can provide a great lifting/buoyancy force on the water thanks to their stable structure. The closed cell structure of the material and its low density properties constitute the most important reasons for this buoyancy force.

A study directly on the buoyancy of PE foam materials could not be reached, at least by us. However, in a study examining the physical and chemical properties of polyurethane foams, there is information that a polyurethane foam material with a density of 40 kg/m³ can float a load 25 times heavier than itself in water (Aydın and Ekmekçi, 2002:45). In addition, we tried to make our own calculations in order to learn the buoyancy of pool noodles made of LDPE material numerically, by using some data and formulas of an academic study on buoyancy equipment used in salt water (Kumar, 2015:12-16). Accordingly, the buoyancy force of a standard PE foam pool noodle with h=160 cm, R=6 cm and m≈0,09 kg values is found as follows, with the help of the formulas in the aforementioned study (it will be assumed that the entire volume of the noodle is immersed in water):

- Volume of one PE pool noodle:

$$V_{PE\ noodle} = \pi \times r^2 \times h = 3,14 \times 3^2 \times 160 = 4521,6cm^3 \approx 0,0045m^3$$

- Density of one PE pool noodle:

$$d_{PE\ noodle} = \frac{m_{PE\ noodle}}{V_{PE\ noodle}} = \frac{90,66gr}{4521,6cm^3} = 0,02gr/cm^3 = 20kg/m^3$$

- Buoyancy and net buoyancy forces of one PE pool noodle:

$$F_{PE\ noodle\ buoyancy} = V_{PE\ noodle} \times d_{pure\ water} = 4521,6cm^3 \times 1gr/cm^3 = 4521,6gr = 4,5\ kg$$

$$F_{net\ positive\ buoyancy\ force\ of\ noodle} = F_{PE\ noodle\ buoyancy} - m_{PE\ noodle} = 4,5 - 0,09 = 4,41\ kg$$

However, in this formula, which is understood to be a version of the Archimedean formula, it is seen that the gravitational acceleration (g) is neglected while calculating the F (PE noodle buoyancy) value. Also seen that the unit of force is incorrectly expressed in “kg: kilogram”, instead of “kgf: kilogram-force” or “N: Newton”. Adding gravitational acceleration (g = 0,00981 N/gr) to the F (PE noodle buoyancy) formula does not affect the result much, but the final value is found as follows:

- Buoyancy force of one PE pool noodle:

$$F_{PE\ noodle\ buoyancy} = V_{PE\ noodle} \times d_{pure\ water} \times g_{gravitational\ acceleration} \\ = 4521,6cm^3 \times 1gr/cm^3 \times 0,00981N/gr = 44,35\ N = 4,435\ kgf$$

- To convert the unit of force (N: Newton) to the unit of mass (kg: Kilogram):

$$\frac{44,35N}{9,81} = 4,52kg$$

- Net positive buoyancy in mass for one PE pool noodle in fresh water:

$$F_{net\ positive\ buoyancy\ force\ of\ noodle} = 4,52\ kg - 0,09\ kg = 4,43\ kg$$

All these structural features of PE pool noodles provide the opportunity to redesign traditional reed boat forms, which are tied in tight bundles and combined with a certain stacking order, with a new approach today. As a matter of fact, during our internet research, which continued after the completion of the preliminary processes such as idea/concept creation, sketch drawing and production of test models, it was seen that this new approach has already been implemented thanks to some product examples produced by others (see: 4.1.3. Analogous Product Research).

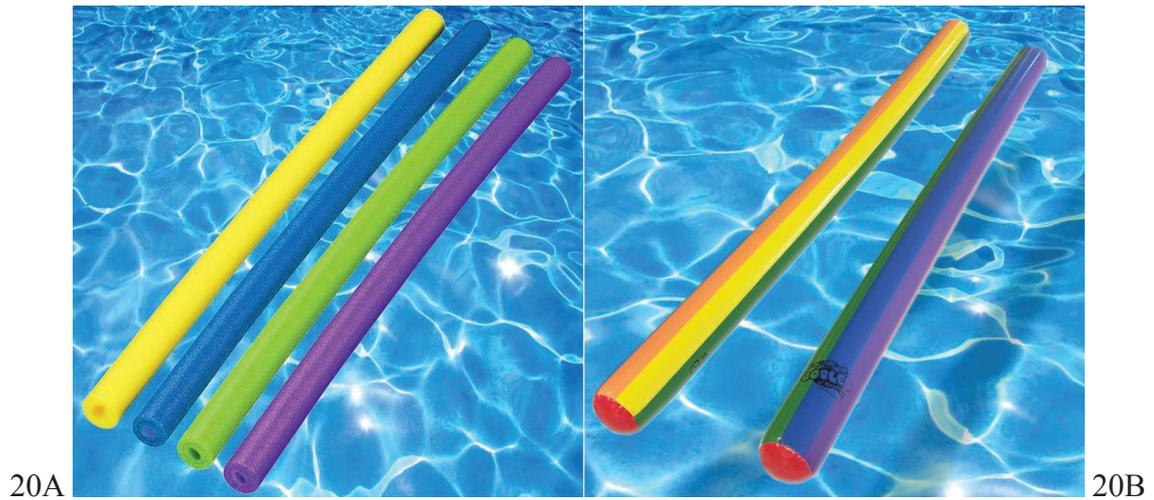


Figure 20. PE foam pool noodles and PVC inflatable pool noodles
(20A-Source: URL-15) (20B-Source: URL-16)

2.2.4.2.3. Comparison of Inflatable PVC Toys and PE Pool Noodles

In this section, it is tried to compare various advantages and disadvantages of inflatable aquatic toys and aquatic toys made from pool noodles. The materials used in both plastic product groups exhibit some production and usage advantages against each other, both technically and economically, thanks to their chemical structures and the physical properties caused by this.

When aquatic toys with a carrying function come into question, firstly and mostly inflatable aquatic toys come to mind. Perhaps the most important reason for this is that the toys in this group are the most well-known and customary products in their field. In this respect, even with a simple market research, it can be observed that inflatable PVC toys have established a general hegemony in the aquatic toys market. Based on this kind of observation, it can be easily said that the main reason for the said market dominance is that inflatable PVC toys offer a rich variety of types and quality and accordingly different price options that vary for every budget.

On the other hand, despite the increasing popularity of PE pool noodles in various general usage areas from sports activities to hobby and DIY projects, it is observed that their use in professional aquatic toy design is still limited. Especially in internet-based research, it is possible to come across many creative DIY projects whose main construction material is PE pool noodles. However, it can be said that such

designs, including some aquatic toys, are generally far from being industrial products in the sense of mass production. However, such DIY projects always have the potential to offer new ideas for the industrial design & manufacture of RATs.

One of the most important features of inflatable PVC toys that can not be denied is that the air inside them can be extinguished after their use and the dimensions of the toys can be reduced to sizes suitable for storing them. This also provides a kind of portability advantage for such products. In addition, considering its economic and technical suitability for various production methods, producing such toys from inflatable and therefore air-trapping PVC membranes seems like a reasonable choice at first glance. In this way, the production of the air compartments that will form the formal structure of the toy can be done economically by using suitable production methods such as strong adhesives and/or thermal bonding.

In addition to the above-mentioned features, their lightness, very high buoyancy, resistance to outdoor conditions such as salt water, sand, sunlight and many chemicals are other important usage features of inflatable PVC aquatic toys. Similarly, pool noodles made of PE foam also have some important usage characteristics of inflatable PVC toys such as lightness, high buoyancy, resistance to outdoor conditions and chemicals.

In fact, toys in both groups rely principally on the phenomenon of trapping air in a closed, liquid and gas-impermeable space to provide buoyancy. In this way, since their density will be less than the density of water, the toys in both groups will be able to float on the water and will be able to float a certain amount of weight that will be loaded on them. The only difference is that the air, which sustains the physical structure of the toy by creating an internal pressure inside the inflatable PVC toys, can be discharged with the help of an air valve when desired. In PE noodles, on the other hand, the air is permanently trapped by a large number of closed air spaces that occur naturally in the usual manufacturing process of the foam material. Therefore, the volumes of PE pool noodles are not changeable as in inflatable toys. This feature brings with it some advantages and disadvantages in the design of RAT to be produced from pool noodles, as will be mentioned later.

Sometimes, inflatable toys can be expensive options because of some variables such as their big size options, complexity of their design features, material and workmanship qualities. Considering that children can always be “extraordinary users”, any puncture or tear that may occur on the inflatable toy as a result of an accident or

careless/inappropriate use often causes the toy to become dysfunctional and the price paid for the product is wasted. The most negative effects of this issue are observed in relatively low-tech inexpensive aquatic toys, which are generally produced using a single-layer PVC membrane, where there are no extra air chambers, the whole carrier structure is supported by a single common air space. In some cases, it is rarely possible to repair the damage and the repair may not be sufficiently robust and/or safe. Even if any repair to be made is robust and useful, it may not look aesthetically pleasing at least, especially for very expensive and/or flashy products where visuality is important. In summary, it can be said that the possible risk factors for the safety of use of inflatable PVC toys will increase, especially if the aforementioned damage occurs while the user is on the water. Therefore, the inflatable feature, which provides such toys with significant advantages in terms of ease of use, such as lightness, portability and storability, also poses a potential and/or relative disadvantage in terms of usage safety and material durability. In contrast, any aquatic toy made from pool noodles appears to have some advantages in terms of usage safety and material durability, thanks to the relatively more stable material structure of PE foam. Thanks to the closed cell structure of the material, even if the physical integrity of the toy deteriorates when the user is on the water, in the worst case, unlike an exploding inflatable toy, the pool noodles will maintain their buoyancy and provide a buoyant force for the user.

Especially, the fact that toy-sized inflatable aquatic products can be inflated with a simple hand pump, or simply by blowing air directly with the mouth, provides a great ease of use and independence in the set up of this type of smaller products. However, as the physical dimensions of the product exceed the standard toy dimensions, the amount of air that needs to be pumped will increase, so an auxiliary equipment such as a more powerful electric type air pump will be needed for installation and an energy source to operate this equipment. This can be another relative disadvantage for such large inflatable products, at least where these facilities are not readily available on demand.

Pool noodles are materials suitable for shaping thanks to their long cylindrical structures that can be bent to a great extent. Depending on the joining method used, permanent or detachable connected toy designs can be made. In designs where toy parts can be disassembled and reassembled, with the help of suitable fasteners designed for this job, pool noodles also give users the opportunity to make their own alternative designs by changing the formal structure of the toy.

Besides many advantages of PE noodles such as flexibility, shock absorbency, physical stability and high buoyancy, the biggest disadvantages are due to the volumetric stability of the material. In particular, the volumetric size of the toys, which are designed with a fixed structure in terms of modularity and using a large number of pool noodles to provide more buoyancy, make it difficult to transport and store them after use. The flexibility of PE pool noodles is high within certain limits when used alone. However, PE noodles are not suitable to fit into narrow volumes for transport or storage when they form the structural integrity of a toy by combining them with various joining methods. Otherwise, the structural integrity of the toy may be damaged.

In addition to the many production and usage advantages aforementioned, it is known that PVC inflatable toys bring with them some serious health risks in terms of material chemistry. It is widely accepted in the literature that various chemical additives such as phthalates, which are used to give elasticity and softness to the material, especially in the production of inflatable PVC membranes, cause numerous health problems, especially oncological and endocrinological diseases and developmental disorders (Ünver, 1998:65; Koyuncu and Eti Aslan, 2014:118,120,121; Özbirinci, 2019). Some of the findings in the conclusion part of the “Characterization of Odorants in Inflatable Aquatic Toys” by Wiedmer et al. (2017), while displaying a cautious expression, also provide remarkable evidence for our study:

In the present study, substances responsible for the intense odors of inflatable aquatic toys for children were investigated in four exemplarily chosen samples. The material of all samples was identified as plasticized PVC using a combination of several material analytical techniques. (...)

Some of the identified odor-active substances (...) are also potentially hazardous. Nevertheless, to evaluate if these substances might pose a risk to children’s health due to their emission or migration, further investigation of relevant exposure scenarios is required. Accordingly, our study shows that the intense smell of a product may be a hint for potentially hazardous compounds. (...) (Wiedmer et al., 2017:3914,3915).

In fact, it is a generally accepted issue that plastics are more or less harmful to human and animal health from various aspects. Due to their chemical structure, the fact that their waste causes environmental pollution and various threats for the health of all kinds of life is the justified reason for plastics to have a general and bad reputation. In this sense, it can be said that the greatest danger comes from various additives added to the structures of plastic polymers to facilitate their processability and that dissolve and oscillate depending on the environmental conditions such as acidity-basicity level,

exposure to temperature and sunlight, and contact with water (Özbirinci, 2019). In a compilation study on disposable plastic products used in the health sector, the damages caused by plastic materials are summarized as follows:

The widespread use of disposable plastic materials increases the amount of hospital waste and these materials carry infections that also threaten human health and the environment in terms of chemical, toxic, teratogenic, mutagenic and carcinogenic risks (...) In the production of disposable plastic materials, materials such as latex, polyvinyl chloride (PVC), Bisphenol-A (BFA) are widely used. It is reported in the literature that these materials have harmful effects on the environment and human health during the production, use and disposal (...) (Koyuncu and Eti Aslan, 2014:117,118)

Compared to PVCs, it can be said that PEs also have some harmful effects, especially on environmental pollution. On the other hand, it is also stated that PE derivatives are generally harmless or less harmful to human health than many other plastics. For this reason, PE derivatives, and by the way PE foams, are economical and useful raw materials and/or materials that are widely preferred in various fields of industry, especially in the manufacture of products that directly concern human health, such as food packaging and kitchen equipment, health equipment and toys (see: Ünver, 1998:67,68; Koyuncu and Eti Aslan, 2014:122; Özbirinci, 2019; R. Polat, 2016).

As a result, it can be said that in both plastic product groups, some material properties characteristic for that group can exhibit both advantages and disadvantages from different angles at the same time. Despite everything, PVC and PE derivatives seem to be materials that can be preferred for a longer period of time in aquatic toy design, as in many areas of the industry, primarily because they are economical and can be easily processed.

	<u>Inflatable Aquatic Toys</u> Material: PVC Tarpaulin	<u>Pool Noodles</u> Material: PE Foam
STRENGTHS	<ul style="list-style-type: none"> • Interchangeable volume (due to be inflatable) • Ease of thermal processing • Ease to carry • Ease to store • Product variety • Flame reterdancy options 	<ul style="list-style-type: none"> • Lightness • High buoyancy performance <ul style="list-style-type: none"> • Comparatively low cost • Resistance to chemicals (!) <ul style="list-style-type: none"> • Wide color options • High flexibility <ul style="list-style-type: none"> • Self-cleaning • High water repellency <ul style="list-style-type: none"> • Electrical resistance • <u>Compatibility with outdoor conditions</u> <ul style="list-style-type: none"> <u>Saltwater</u> <u>Daily temperature differences</u> <u>UV resistance</u>
WEAKNESSES	<ul style="list-style-type: none"> • Contains carcinogenic additives like phthalates • More risky material production and disposal for health and ecological pollution • High risk of chemical material release • Risks of puncture/explosion or tear 	<ul style="list-style-type: none"> • Ease of processing • High impact strength • Low risk of chemical release • More ecological and healthy material production and disposal • Suitability for various insulation works • Material durability

(!) PVCs are known to be affected by some solvents

Figure 21. Strengths and weaknesses of inflatable aquatic toys and pool noodles

2.2.4.3. Concept Generation for RAT Design

In general, one of the important and indispensable preparatory stages of any industrial product design is “Concept Generation”.

According to the Büyük Larousse, the concept is defined as “the general and abstract idea that allows the human mind to connect the various perceptions it has obtained from a concrete or abstract thought object to that object and to regulate the information about that object” (“Kavram”, 1986). Akarsu (1975), on the other hand, gives the philosophical meaning of the term “concept” as follows:

The general design that covers the common features of objects or events and collects them under a common name (...) (In classical logic) The simplest and most basic element on which verdict and inference will subsequently be built. In reality, the concept is the starting point of thought and it is a point where thought collects and concentrates. Concept is the form of thought transformed into a whole, a synthesis, a unity (Akarsu, 1975:106,107).

Tiryaki and Sunar, the editors of the book “Concept Development-New Possibilities in Social Sciences” (2016), state in the presentation part of the book that the term “concept” comes from the Latin “conceptio” root and has an important meaning for constructing ideas. Accordingly, the term “conception”, which comes from the same root in Western languages, also has meanings such as “insemination, fertilization, the beginning of pregnancy”. This also means that concepts are indispensable starting elements for every new thought (hence new design ideas) and for their transformation into reality: “(...) Concepts constitute the beginning of a new thought coming to life. It is impossible to give life to a new thought without concepts. We think with concepts, express with concepts, give life with concepts. (...) New concepts are required for new births ” (Çitil et al., 2016).

As can be seen, all the definitions given emphasize the characteristics of each one of the concepts to be a starting point, based on a common acceptance.

The process called “concept generation/production” (sometimes “concept development”) in industrial design can be summarized as selecting the most appropriate one among more than one design idea obtained by determining customer requirements and accordingly by determining targeted features for the possible product. Ulrich and Eppinger (2000) qualify the “product concept” as an approximate description of a product’s technology, operating principles and form. According to this, product concept is a shorthand description of how the product meets customer satisfaction. Again, according to Ulrich and Eppinger, the quality of the product concept can be considered as one of the important determinants of customer satisfaction and hence company success:

The degree to which a product satisfies customers and can be successfully commercialized depends to a large measure on the quality of the underlying concept. A good concept is sometimes poorly implemented in subsequent development phases, but a poor concept can rarely be manipulated to achieve commercial success. Fortunately, concept generation is relatively inexpensive and can be done relatively quickly in comparison to the rest of the development process. (...) Because the concept generation activity is not costly, there is no excuse for a lack of diligence and care in executing a sound concept generation method (Ulrich and Eppinger, 2000:108).

The first sketches to be prepared about what the design product will look like begin to take shape as a result of concept generation. Concept creation offers the

designer an intellectual or fictional starting point in determining a series of features such as what the product to be designed will look like, which materials and production techniques will be used.

In the product design process, many methods can be used to create concepts, in other words, inspiration can be obtained in a variety of ways. Bayazit (2011) exemplifies these various ways under some 30 subheadings as some basic approaches: Making historical analyzes and cross-cultural comparisons, using mythology, determining numerical goals and/or distinctive qualities related to the product to be designed, using visual games etc. According to Bayazit, concept determination methods require different approaches according to the type or areal content of the design problem. Concept determination for engineering, architecture and industrial design is done in different ways. For example, while the concept is determined according to the specifications and customer needs in engineering designs, concepts that focus on visuality in jewelry design should be determined (Bayazit, 2011:203). On the other hand, Ulrich and Eppinger (2000), suggest a 5-step concept creation method (Fig. 22). According to this method, a complex design problem is divided into simpler sub-problems. Then, the solution concepts for these sub-problems are tried to be determined with the help of research methods that are defined as internal and external. In this sense, tools and/or methods such as “classification trees” and “concept combination tables” are also used (Ulrich and Eppinger, 2000:109,110).

In order to obtain the concept-determining elements for the visual/structural design and construction techniques of our toy proposal, some historical/cultural data belonging to various ancient and contemporary cultures in the subjects of maritime and watercraft were investigated. In addition, Vicky the Viking cartoon series as a product of today’s popular culture has also been taken as another conceptual starting point of our design process.

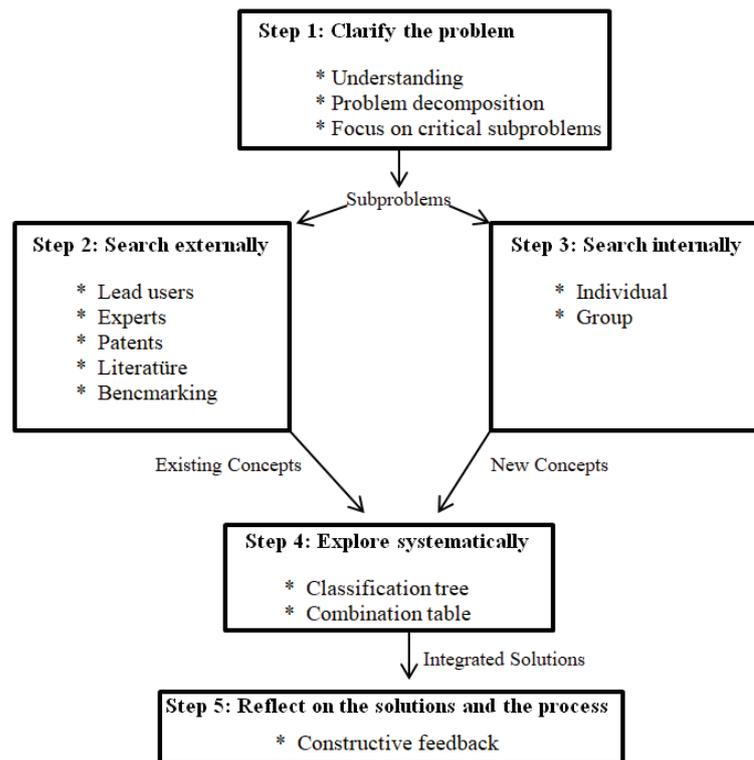


Figure 22. The five-step concept generation method
(Source: Ulrich and Eppinger, 2000:110)

2.2.4.3.1. Historical and Cultural Roots for Concept Generation

As mentioned briefly before, historical and cultural elements can offer designers various design ideas. Hence, the examination of some boat types used by ancient cultures constitutes the first of the conceptual starting points for the stylistic design of our rideable aquatic toy sketch. In this respect, boats seen in various civilizations of Antiquity such as Egypt, Mesopotamia, Phoenician, Greek and Roman and whose prows (the head/front of the boat or ship) were decorated with carvings in the shape of animal or mythological creature heads came to the fore as a characteristic group in our research with their interesting visual features. Especially in the Assyrian period, water crafts such as boats or ships, which were used along the banks of the Tigris and Euphrates in Mesopotamia and whose prow were decorated in the shape of a horse's head, are included as "hippoi" in the literature (Albayrak, Öz Kiriş, and Erol, 2019; Yalçinkaya, 2016) (Fig. 23, Fig. 24). Yalçinkaya (2016) states in her thesis that these watercraft, also known as "hippi", were also used by the Ancient Phoenicians.

Accordingly, it is known that even at the end of the 20th century, some fishermen still decorate their boats' prows with carvings in the shape of horse heads in Cadiz, a coastal city in Andalusia, southwest of Spain (Yalçinkaya, 2016:7,113,120).

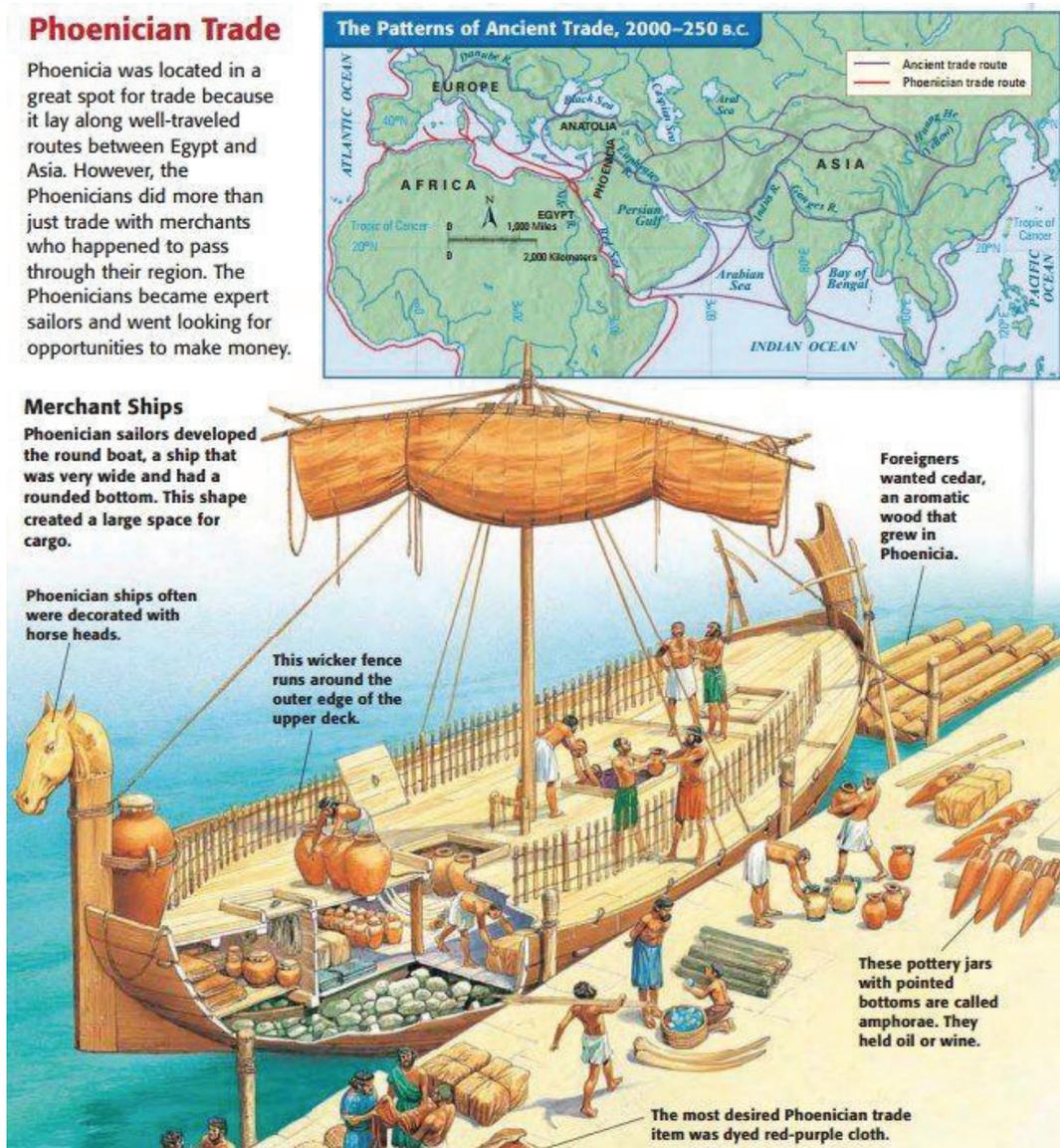


Figure 23. Representative illustration of a Phoenician hippoi

(Source: URL-17)



Figure 24. Detail of a relief depicting a hippoi type boat

(Khorsabad Palace/Dur-Sharrukin: “The Castell of Sargon”, BC 722-705, Louvre Museum)

(Source: URL-18)

Another people known to decorate the prows of their ships with carvings in the shape of mythological creature heads are the Vikings who lived in Northern Europe, especially in Scandinavia, between the 8th and 11th centuries. Recognized as an invading and warrior nation, the Vikings were also famous as master sailors, merchants, and pirates. It is known that the Vikings, who are called “Varangians” in the East and “Normans” in the South, embarked on their invasion and colonization expeditions from Scandinavia, their homeland, to the near and far realms with warships called “the long ship” in the literature (These thin and long ships are referred to as “onekkja” in the *Büyük Larousse*) (“Vikinger”, 1986) (Fig. 25). Perhaps as a nickname, these ancient ships, usually decorated with a dragon head and pupa (stern, back of a boat or ship) carved in the shape of a curved tail, were called “drekar/drakar/drakkar”, meaning “dragon” in the Scandinavian languages (Fig. 26). Dragons are also powerful symbolic elements in the Viking mythology, which forms an important part of the Northern peoples mythology. Thus, it can be said that dragons took their characteristic and symbolic places in Viking shipbuilding as a sign of strength and/or an element of horror against the enemy. Considering that the Viking warriors were also famous as invading, plundering, ruthless pirates, the reason why dragon heads were used as an element of horror on the prows of the Viking warships becomes clearer. Similar uses of dragon symbolism can be seen in many other cultures:

(...) Scandinavian pirates painted Dragons on their shields and carved heads into the bows of their long ships. Among the Romans, the Dragon was the token of the infantry battalion, and the eagle was the token of the legion (...) Saxon kings in England also had Dragon images on their banners; the purpose of such paintings was to spread fear into the enemy ranks. In the ballad of Athis, we read the following lines: 'This is what the Romans carried / This is what frightens us like that' (...) (Borges, Guerrero, and Komçez, n.d.:42-44).



Figure 25. Representative illustration of a Viking long ship (Drekar/Drekkar)

(Source: URL-19)



Figure 26. Wooden adornments of Drekar prows
(26A-Source: URL-20) (26B-Source: URL-21)

With its interesting ship designs and other historical and cultural elements, the ancient Viking culture takes its place in today's popular culture as a source of inspiration for various types of productions that appeal to audiences of all ages. For this reason, we were inspired by the historical Viking warships as we aimed to create a fantastic sense of adventure in children with the characteristic shape of our toy while making the typical visual design of our toy proposal. In addition, our research on Viking ships has caused us to turn our attention to the cartoon series "Vicky the Viking" as another conceptual starting point that we think children will be more interested in, as will be emphasized later.

Some traditional handmade watercraft, which are still used in some indigenous societies whose origins are older and even exist today, give an idea to our rideable aquatic toy design with their materials and construction techniques as another cultural element. In this sense, the most remarkable examples are "reed boats" with their material stacking and combining methods (Fig. 27) (see: 4.1.6. Full-Size Prototype Production Trial of the Boat Hull).

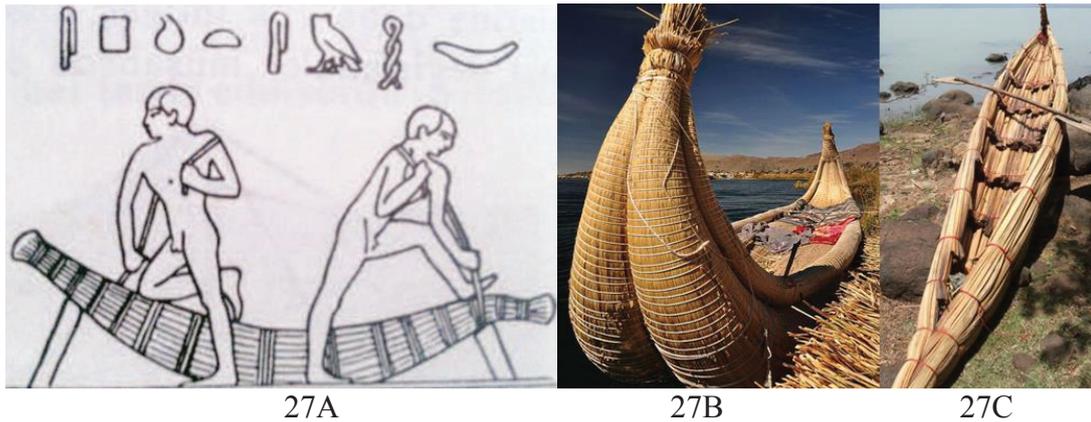


Figure 27. Some reed boat examples

(27A-Source: İnan, 1992) (27B-Source: URL-22) (27C-Source: URL-23)

2.2.4.3.2. An Inspiring Concept from Popular Culture: Vicky the Viking

Cartoons and various animation productions are the leading programs that children watch on television and in the cinema. It is seen that cartoon characters or 3d animation characters in cartoons, video games, comic books and illustrated child books are frequently used in the design of industrial toys and/or children’s products and their packaging, as the marketing tools/elements (Ak, 2006:73,76,78,79; Sakar and Karaduman, 2017:3; Yazıcı and Aktin, 2018:411,412). One of the conceptual inspirations of our toy proposal, which is an example of our study subject, is Vicky the Viking, which has been broadcast on world televisions since the 1970s with various adaptations such as cartoon series, 3d animated films.

Vicky the Viking (German: Wickie und die starken Männer, Japanese: Chiisana Viking Bikke) is an Austrian-German-Japanese co-production cartoon series adapted to television from a series of children’s novels, which began to be written in 1963 by Swedish journalist-writer Runer Jonsson (29.06.1916-29.10.2006) under the name “Vicke Viking” (Wikipedia, "Vicky the Viking", 2020b). The novel, which was first published in 1963, is known to be inspired by Icelandic sagas (epic folktales unique to northern European countries) and the novel “Long Ship” written in Swedish. Illustrations of the original novel were drawn by Ewert Karlsson (Wikipedia, "Vicke Viking", 2020a). In the novel and the television productions adapted from the novel, the adventures of Vicky and his friends, the intelligent and helpful son of Halvar, the head

of a Viking village named Flake, is storied. Vicky is portrayed as a little boy, at the age of 9, who is frail and timid, with a phobia of wolves. Despite his these weaknesses, Vicky also has a sharp and practical intelligence and imagination that he uses in every adventure to save other Vikings and his village from all kinds of difficulties. His greatest supporter is his neighbor's daughter, Ylvie (Ticky in the British version), who is the same age as himself. It is known that the first original version of the series on television was released between January 1974 and April 1976. 3D animation versions of the series were also made in 2013-2014 (Wikipedia, "Vicky the Viking", 2020b).

Often Vicky and other Vikings set sail on their adventures using their traditional long warships known as "Drekkar". In a part of their adventures, it is told how they survive their enemies by flying their ships, Drekkar, with kites (Episode 19: Airborne).

Vicky the Viking Series and the ship mentioned here take part in our thesis study as one of our starting points and/or inspirations during the concept generation phase for our application project. In this way, it was aimed to establish a relationship based on the children's familiarity with the design of our toy, the attraction of the imagination resulting from the character traits of the toy, and their adoption of the toy. In this sense, attracting the attention of parents as the main buyers performing the purchasing function is another important goal. As Çiçek (2011) also mentioned in his study, families have a significant effect on individuals' purchasing behavior. Accordingly, the continuous interaction between individuals and family members creates a group effect on the individual in terms of purchasing. It can be said that when it comes to children, the main source of this interaction is that they learn the cultural and social values that will affect them throughout their life from their families (Çiçek, 2011:9). It is known that parents are generally more likely to recommend toys/children's products that they like, sympathize with or approve of to their children. Güntürkün (2009) also quotes a similar view in his study: "Adults prefer to buy toys for their children, which provide an escape from the realities and limits of daily life (...)" (Ambeck-Madsen, 1995:14 cited in Güntürkün, 2009:14). It can be said that the parents of the target group subject to our study are mostly "Generation Y" members. According to Kyles, those born between 1980-1999 are called "Generation Y" (aka: "Nexters"/"Millennials") (Kyles, 2005:54,55). Assume that most of the parents in this group enjoyed watching the cartoon Vicky The Viking in their childhood: In this case, it is possible that the parents would potentially sympathize with our toy proposal because of their own childhood memories, thereby promoting their children to choose it. Based

on this possibility, the product is expected to be an attraction for both parents and children. Nevertheless, it is also a well-known fact that the pleasures and preferences of their children are important and prior determinants for many parents in purchasing products such as toys produced directly for children (Bolişik et al., 2014; Yazıcı and Aktin, 2018).



Figure 28. The characters of the “Vicky the Viking” cartoon series

(Source: URL-24)

2.2.4.4. Visualization of Design Ideas

Every design originates as an idea. Therefore, what is called the idea of design is essentially a mental and abstract production or act. In this sense, we can name the activity and process of making the design idea tangible through various methods such as making some drawings, producing physical models and prototypes, as “visualization of design”.

2.2.4.4.1. Sketch Drawings

The Turkish equivalent of the word “sketch” is “draft”. According to the Büyük Larousse (1986), a draft is defined as “a preliminary study showing the general form of a work, especially an art or literary work”. Accordingly, a draft defines works of art that are under construction, especially in the field of fine arts, in which the general lines and/or elements of a composition have begun to form but the details have not yet become clear (“Taslak”, 1986).

In the initial stages of the process of producing/developing a new product and/or service, the fictional design ideas that emerge and develop in the mind of the designer first and in the most practical way gain a tangible structure thanks to sketch drawings. In this way, the phenomenon of design, which emerges as an abstract fiction, becomes easier to understand, share and interpret without the need for pages full of verbal expression. Visualization of design ideas through drawings helps to have a preliminary idea on various issues such as what the physical and functional properties of the final product will be, whether it will meet customer requirements, and whether the design will go into production. Sketches can serve as a source for the derivation of new ideas, and therefore new sketches, during the design stages, and they can be kept for this purpose. It is also recognized that sketches are a kind of communication tool:

Sketching is a key research and development tool that enables designers to evaluate their ideas on paper, storing concepts for later discussion , manipulation and iterative development. The act of sketching works as a means of firming up a research idea; it allows designers to wrestle with design possibilities, and attempt to give form and meaning to an idea.

Usually designers will start generating their ideas with a pen or pencil and paper. Most designers utilize these tools at the early stages of the design process because of the immediacy of the sketching process, the freedom provided and the temporary nature (sketches can easily be erased, revised and redrawn) of pencils and paper. A designer also annotates his or her sketches - notes will act as aides- memoire for the designer and also help identify key points so that his or her ideas can be communicated to members of the design team and all the stakeholders involved (...) (Milton and Rodgers, 2013:34).

Bayazit (2011) qualifies sketch drawings as “two-dimensional models made in the first conceptual stages of design”. According to this, “two-dimensional drawings are obtained by drawing and painting, either by hand or by computer, to give a three-dimensional view of the conceptual design” (Bayazit, 2011:170). According to Andersson (2006), who defines sketches as the “visual language of the designer”, “the

ability to sketch is one of the most valued skills among industrial designers, their co-workers and clients (...)” (Andersson, 2006:5). Accordingly, designers can quickly identify problems related to designs, discover and/or develop new/different ideas and forms by using paper-pencil, digital media and/or a combination of these, thanks to their sketching skills. In other words, they formulate a mental image concretely on paper and almost as soon as it comes to mind. It is also possible to make iterative revisions in the same fast and practical way. Andersson qualifies the use of sketches as an invaluable tool in teamwork such as brainstorming and concept evaluation (Andersson, 2006:5).

Various sources divide sketch drawings into various groups according to their intended use or function. While some sources divide sketches into two broad categories as “thematic sketches” and “schematic sketches” (Milton and Rodgers, 2013), others refer to “investigative and explorative”, “explanatory” and “persuasive” types of sketches (Olofsson and Sjölen, 2006; Sjölen and Macdonald, 2011).

Thematic sketches are mostly exploratory drawings prepared to understand what the design will look like. They reveal the physical form and features, general aesthetics of the product and/or design. In this type of sketch drawings, some of which are described as “doodles” and “thumbnails” by Eissen and Steur (2012:12), initially restrictions and criticisms are not taken into account to allow new discoveries. These are free, fluent and dynamic drawing types that are expected to reflect the formal features of the product/design in an impressive way.

Schematic sketches, on the other hand, are drawings related to the more technical and numerical parameters such as operation of the product, ergonomics and dimensions (Milton and Rodgers, 2013:34-37). Technical drawings such as side views and exploded drawings, which are described as pre-engineering drawings (Eissen and Steur, 2012:17), can be given as examples of schematic sketches.

Andersson (2006) qualifies the types of sketches, which he classifies as “persuasive”, as more impressive in terms of their artistic qualities than “exploratory” and “explanatory” sketches. These are often referred to as “renderings” and take much more time to complete than other types. The main purpose of these drawings is to “sell” the proposed design concept to influential stakeholders such as CEOs or Design Managers (Andersson, 2006:5). According to Ulrich and Eppinger (2000), renderings are “information-intensive” drawings used in the further refinement of design ideas and selection of the final concept. These show the details of the design and depict the final product at the time of use: “(...) Drawn in two or three dimensions, they convey a great

deal of information about the product. Renderings are often used for color studies and for testing customers' reception to the proposed product's features and functionality (...)” (Ulrich and Eppinger, 2000:222).

In summary, it can be said that visuality and artistic effect are more prominent in thematic drawings in terms of the presentation of design ideas, while schematic drawings generally provide more technical data about the production process. According to all these, it is understood that the basic function of all kinds of sketches, whether thematic or schematic, is to provide a communication based on visualization.

2.2.4.4.2. 3D Visualization with CAD/CAM Methods

Today, CAD/CAM (Computer Aided Design/Manufacturing) methods are frequently used in the visualization or concretization of conceptual designs and/or design ideas. The use of such systems, called “Computer Aided Industrial Design/CAID” by Ulrich and Eppinger, in industrial design and production started at the end of the 20th century (Ulrich and Eppinger, 2000:225) and is increasingly developing today. Thanks to the CAD method, many visualization processes from two-dimensional (2D) sketch drawings to three-dimensional (3D) drawings and then solid/physical modeling of design ideas can be done in a virtual environment and at high speed. In addition, it is also possible to concretize these 3D design ideas modeled in the virtual environment as physical outputs (e.g. rapid prototypes or end products directly) as a result of the cooperation of other computer and machine-supported systems by using CAM methods (see also: Ulrich and Eppinger, 2000:225). In this sense, many design programs for 2D and 3D modeling, visualization and graphic design have been developed by different software companies to be used in computer environment: AutoCAD, 3DSMax, Rhinoceros 3D, SketchUp, Maya, Catia, SolidWorks, Revit, Autodesk Fusion 360, JewelCAD, Adobe Photoshop, Adobe Illustrator, CorelDRAW etc.

In recent years, the use of cloud-based systems that rely on an internet network has become widespread in most of such programs for reasons such as interactive work between groups, fast data sharing, large storage space requirements, prevention of data loss, and access to these data whenever required. The most up-to-date three-dimensional design programs also offer a “parametric” working environment. This means that

various parameters of the model are associated with each other in the modeling process thanks to the algorithmic and numerical software features of the program. Thus, any change made in one of these parameters at any stage of the design process can also automatically change other parameters associated with that parameter (see also for parametric design: Karsan Erbaş, 2013).

Especially, thanks to the features of 3D design programs such as material libraries and scene settings, highly realistic renderings of the three-dimensional models of the final product can be obtained virtually. If necessary, situations such as mechanical operation of the product or product parts and some strength/deformation tests of the materials assigned to the model can be simulated as an animation in the virtual environment. In this way, in order to identify and solve some possible design and production problems at early stages, designers can perform the various trials, changes and adjustments for the design product that should be done before production. This also reduces production costs by preventing material, labor and time wastage. In this respect, it can be said that CAD systems are important tools for the approach introduced by Crawford and Di Benedetto (2003) as DFM (Design for Manufacturability) (for CAD and DFM, see also: Crawford and Di Benedetto, 2003:292,293).

Beyond their contribution to the production process, it is seen that high quality and realistic visual materials obtained by CAD systems are one of the most important presentation/communication and persuasion tools for designers:

During the development of a new product, a product designer will often make hundreds of quick sketches and models. However, when presenting these ideas to the client and others in order to communicate intentions of size, shape, scale and materials, these rough sketches and models will need to be tidied up so as to present something more visually seductive.

The designer has to shift from a three-dimensional idea into a two-dimensional sketch, and then back again into a three-dimensional representation of that idea. The widespread adoption of CAD has led to many designers developing their ideas virtually, visualizing their new products and concepts through photorealistic renderings of 3D models and scenes. The use of digital models allows for the quick exploration of new design ideas, materials and textures, and often provides a more cost-effective alternative when it comes to producing physical presentation models and photographing them (...) (Milton and Rodgers, 2013:162).

In summary, thanks to computer-aided design programs, it is possible to produce very realistic visuals of what the final product will look like. Before the production of the final product, the necessary changes can be made easily, depending on the designer's capacity/competence to use the program. These drawings are important in terms of determining and/or selecting the design ideas by presenting them to the

manufacturer and user opinion in the most effective way before the physical production of the product prototype, which is a costly process in many time (see also: Crawford and Di Benedetto, 2003:284,285).



ID 512 Advanced Product Design dersi kapsamında "NOSYON Tasarım ve Inovasyon Şirketi" adına, tanınmış bir GSM şirketinin çözüm ortaklığını üstlenen özel bir firma için Fusion 360 modelleme programı kullanılarak yapılan iç mekan tasarımı (2018-19 Güz Dönemi, İYTE, İzmir)
Tasarımcı: Merter YALÇINKAYA

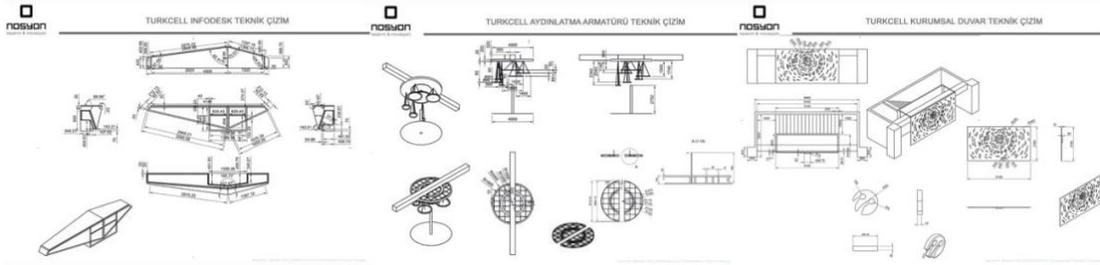


Figure 29. Thematic and schematic sketch samples drawn using a CAD program
(Design & 3D Modeling: Merter Yalçinkaya, İzTech, Fall Term 2018-19)

2.2.4.5. Physical Model Making

Physical/tangible models are trial and evaluation tools that are frequently used in various stages of industrial design and production. According to Bayazıt (2011), “A model is a kind of representation of reality (...) From the systemist point of view, the model is another system that is an auxiliary tool used to represent a system (...)” (Bayazıt, 2011:170). Accordingly, the size and quality of the model varies according to the features of discipline in which it is used.

As mentioned in the previous chapters, sketches prepared on the computer with CAD methods are also qualified as digital models in a way because they visualize a three-dimensional design idea on a two-dimensional surface and in a photorealistic way. Therefore, even as such, it can be said that they are generally effective presentation and

persuasion tools. On the other hand, when it comes to physical model, maquettes/mock-ups and prototypes, which are tangible representations of a physical final product and have various size, material and production properties, generally come to mind. These models and prototypes, which are the physical representation of the final product (or a part of it), are used as useful and indispensable researching, learning, informing, evaluating, decision-making and presenting tools in various design processes:

(...) The widespread adoption of CAD has led to many designers developing their ideas virtually, visualizing their new products and concepts through photorealistic renderings of 3D models and scenes. The use of digital models allows for the quick exploration of new design ideas, materials and textures, and often provides a more cost-effective alternative when it comes to producing physical presentation models and photographing them.

However, while digital models are ideal for generating visuals for marketing and advertising material and presentations of new products, there is no substitute for a well-resolved tangible physical models that consumers and clients can see, feel and engage with. Product design is a three-dimensional discipline, and while the immediacy of marker renderings and the visual gloss and ease of CAD offer huge possibilities, it is essential that designers model their concepts physically and test and present them in the real world (Milton and Rodgers, 2013:162).

In daily speech, it is seen that the terms “model” and “prototype” are often used interchangeably, based on the function of “representation”, which is their common use purpose. However, physical models can be categorized under different names in terms of their various using purposes at different stages of the design process and the different material, scale and production features they have: “maquettes/mock-ups”, “sketch models”, “appearance models”, “quick-dirty prototypes”, “paper prototypes”, “rapid prototypes” and so on. Of these, “sketch models” are mostly scaled (usually full-size) models that are hand-formed from material such as polyurethane foam, which can be easily accessed to embody the first design ideas. They are generally raw in terms of the materials used and cannot directly represent the design of the final product (Milton and Rodgers, 2013:95). In this respect, it can be said that they are more suitable for developing design ideas. Ulrich and Eppinger (2000) qualify these kinds of foam models made in full size for use in the “preliminary refinement” phase of product design and development process as “soft models” (Ulrich and Eppinger, 2000:221).

Mock-ups are full-size models made from cheap and alternative materials, just like sketch models. However, mock-ups are mechanical test tools that are used in evaluating the shape and dimensions of the product, as well as its interaction with the physical environment and user, and its usage characteristics/ergonomics. Thanks to the mock-ups, the functionality of the moving parts of the product and the physical

properties and ergonomics of the design such as strength, rigidity, comfort and durability can be practically simulated and/or tested. For this reason, mock-ups are generally made of relatively hard and durable materials such as wood, plastic, and rigid foam. It can be said that the mock-ups used in the beginning and middle stages of the design process are more costly but indispensable test equipment compared to “paper prototypes” and “quickly dirty prototypes” due to the above-mentioned construction and usage features. Thanks to the mock-ups, the surface features such as color, texture and other details of the product/design that cannot be easily visualized or resolved with sketches or technical drawings can also be physically simulated and tested by the design team and engineers.

Mock-ups that do not incorporate any product styling and are only intended to demonstrate the basic mechanism of a product are typically referred to as proof of concept models. These are used to ‘prove’ the viability of a potential design approach, such as a product’s range of motion, mechanics, sensors or architecture.

Mock-ups are a key development and standards testing tool, helping designers to validate design options and determine where further development and testing are necessary. They also provide the engineering team with the opportunity to do a final check for design flaws or possible last-minute improvements. The cost of producing mock-ups is often outweighed by the savings made by avoiding going into production with a design that needs subsequent improvement (Milton and Rodgers, 2013:96,97).

A group of models known as appearance models can be likened to mock-ups in terms of being large-size (such as 1:4 or 1:10) or full-size, materials used and hand-made techniques. However, they are mostly prepared with the aim of presenting the final product to the customer by simulating the visual properties such as color, texture, transparency, opacity and gloss, and sometimes the weight, in the most realistic way possible. Due to their delicate nature, appearance models are often not expected to be a durable and functioning representation of the end product, as is expected from mock-ups:

(...) An appearance model typically does not function the way a production product would, if it has any functionality at all. Normally internal components do not exist, while all moving parts are fixed in their most preferred or typical position. Sometimes the product is constructed from particular materials so that its weight is represented accurately. This helps assess how a proposed product (e.g. laptop computer) will fit into its environments of use as well as determining whether its physical characteristics are appropriate for the product’s purpose. (...)

Appearance models are often hand-carved, sculpted or machined from a solid block of inexpensive material such as foam, plastic, wood or clay, and subsequently finished and painted to look like the desired end product. Due to the materials used, these models are not especially durable and should be handled with care. Appearance models are used for market research,

exhibition display, executive review and approval, and product literature photographs. Due to their delicate nature they are not commonly used for interaction and handling by presentative users or consumers (Milton and Rodgers, 2013:102).

“Paper prototypes” and “quick-dirty prototypes”, which can be easily prepared by hand from disposable type materials that are available at hand, contribute to the design and development processes in the most economical and fastest way. Paper prototypes are often used to provide a quick feedback on how the web-based/virtual services or interface designs of handheld display devices such as mobile phones and laptops affect user-computer interaction. Quick-dirty prototypes, on the other hand, are usually prepared in the early stages, such as concept development, with the aim of sharing design ideas among members of the design team in a quick and easy to understand way. Therefore, they offer a speed-oriented approach rather than quality. Thus, in some projects with very short lead times, it is possible to reach effective and short-cut solutions in terms of both time and management of other valuable resources by using easily available materials (Milton and Rodgers, 2013:98-100).

As mentioned earlier shortly, some very detailed and functional models/prototypes, which are difficult and time-consuming to produce by hand, can be made automatically and in a very short time, thanks to a series of 3D printing technologies that process computer data. These are known in the literature as “rapid prototypes”. Physical models and even some final products to be produced in this method are usually obtained as 3D printer prints made of plastic polymers. It is known that there are various rapid prototyping techniques depending on the type of 3D printer and the properties of the polymer used. One of the well-known example is “stereolithography,” defined as “an additive manufacturing process used in 3D printing, which builds up layers of solid plastic using an ultraviolet laser and a liquid resin vat.” (Milton and Rodgers 2013:180; see also: Crawford and Di Benedetto, 2003:292,293). In some 3D printers, the polymer raw material (filament) wound on a reel is melted by a heating mechanism and flowed from the nozzle of the printer at a certain speed. The prototype is created in layers by sequential and repetitive movements of the traveling head/nozzle on the printer’s table surface. Here, the dimensions of the model are determined by the dimensions of the table surface that the printer processes and the final height level that the printer nozzle can reach mechanically. Although physical models can be produced quickly with this method, it requires different technical training and

program usage skills compared to hand modeling methods in terms of the effective and faultless application of the method.

In summary, physical model and prototype construction, which is considered a three-dimensional discipline, is indispensable for many important steps in industrial design such as concept selection, testing, design communication, decision making of production and effective presentation. The most important reasons for this are that physical models or prototypes have the ability to represent more than two-dimensional design visuals thanks to their tangible structures, and they often allow direct experience. Many design problems and/or details, for which two-dimensional visualization or expression tools are insufficient, become easier to understand, evaluate and solve by using physical models and prototypes.

CHAPTER 3

METHODOLOGY

The study started at the end of 2018, upon the recommendation of the thesis advisor, with a more general scope of the literature on “toy design”. However, since it was recognized that the subject of “rideable aquatic toys” was not a previously studied research area during our literature review, it was determined as an area worth researching and subsequent studies were conducted within the scope of this subject.

The methodology of the whole project consists of individual observations and researches, literature review, exemplification of the design process through visualization/embodiment of the design idea, testing of the draft toy (mock-up), and fieldwork based on online qualitative surveys conducted separately with three working groups (children, parents and experts surveys).

It can be said that the design and implementation processes of our study methodically exemplify the “Holistic Craft Process” approach introduced by Rönkkö and Aerila (2015). In this approach, all design, production and evaluation processes of the product to be produced are carried out by a single person, as in our study. In other words, in this approach, the designer, who carries out all the research, technical and visual design preparation processes, and the producer (or craftsman) who is responsible for all production processes and ultimately the evaluation of the final product are the same person (Rönkkö and Aerila, 2015:47,48). In the realization of the design and implementation processes of our study, it was necessary to arrange/change the sequence of some conventional methods and processes of this approach due to reasons such as individual production possibilities, time and spatial limitations of the study, and global epidemic precautions. Some implementations of the processes and/or steps were either accelerated or not performed at all for the same reasons. Consequently, a working method has been tried to be adopted within the current social conditions and available production possibilities during the design and implementation stages.

Table 1. Steps of the Research Study

Study	Date	Description
General Comprehensive Literature Review	Oct. 2018	Starting with a more general literature review on “toy design”.
Narrowed literature review and preliminary studies have started	Sept. 2019	Making certain the research scope as “aquatic toys” The first sketch drawings Material researches The first prototype trials in paralell with the narrowed literature review
3D CAD modeling, draft prototyping, small scaled modeling	Dec. 2019	3D modeling with CAD method Production of the small-scale model Trials of making the full-size draft hull in the workshop
First use trials of draft hull prototype	Jan. 2020	Direct using experience in the aquatic environment Recording the test process.
Preliminary Studies of Field Research	Feb./Jul. 2020	Preparations of draft question sets for face-to-face surveys (Child/Parents/Expert) Adapting draft question sets to online surveys (Child/Parents/Expert)
Refinement of online survey questions	Jul./Sept. 2021	Final versions of online surveys (Child/ Parent/Expert)
Implementation of online survey questions and collection of answers	Oct./Dec. 2020	Child Survey (with 9 girls and 16 boys) Parent Survey (with 20 women and 6 men) Open Ended Expert Survey (with 6 experts)
Analysis of survey results	Jul./Sept. 2021	While the general thesis text revision was in progress, the analysis of the survey results was done manually.
Interpretation of survey results	Sept./Dec. 2021	The revision of the text of the thesis continued with the interpretation of the survey results.

Content analysis method was used to evaluate the results of the field study consisting of online surveys. Accordingly, various variables were categorized by determining common or similar keywords and expressions, especially in open-ended answers. It can be said that the greatest difficulty of this method is experienced during the grouping and interpretation of open-ended data. The main reason for this situation seems to be that some participants gave some contradictory/inconsistent and/or slipshod answers in terms of their ability to perceive the questions and express their thoughts in

all three surveys. Although this difficulty arises from the nature of the open-ended data collection technique, it requires considerable effort in applying the method.

In this regard, the classification of some of the answers, which usually have ambiguities due to expression disorders, was made by directly counting the given keywords, ignoring these disorders. The frequencies of the answers were counted manually. As will be seen in the next sections, it can be said that the findings obtained from the field studies generally show similarities with the findings of other studies on toys in terms of their contents.

3.1. Individual Observations and Researches

The personal observations of the researcher were an important determinant in the problem determination phase of the thesis work. In this sense, it has been observed that the aquatic toys used by children in aquatic environments such as beaches and pools are mostly inflatable toys. Probably the most plausible reason for this situation is that inflatable aquatic toys take the first place in children's perception of aquatic toys. Similarly, adults' perceptions of aquatic toys are predominantly in the same direction. On the other hand, despite many advantages such as lightness, elasticity, high buoyancy, resistance to various external factors, stable and long cylindrical structure, it has been observed that the use of pool noodles in water is limited and/or uniform. The ability of pool noodles to float stably on water, especially without the risk of explosion, made us think about whether it is possible to design an aquatic toy that can be an alternative to inflatable toys if several of these products are used together. Thus, the idea that pool noodles could be the main construction material of an aquatic toy arose. As a matter of fact, after the determination and implementation of our design concept, images of some other amateur and/or commercial product examples, in which our carrier hull idea was embodied, were also encountered in the later stages of our research process. For this reason, it can be said that this project, which emerged as a new product design idea, has turned into a product development project, in a way, by differentiating from its peers thanks to some additions and/or improvements.

3.2. Literature Review

According to Milton and Rodgers (2013), a literature review is shortly, a text that deals with the key points of existing knowledge about a subject, making use of substantive findings as well as theoretical and methodological:

A literature review examines published scholarly articles, papers, books, scientific reports and other relevant sources (academic dissertations, conference paper, trade magazine articles and so on) that provide an informed description, summary or critical account related to a particular design issue or area of exploration. The purpose of a literature review is to gain an overview of the significant literature published on a particular topic that will allow the design team to develop an informed opinion and perspective on the subject. It may, therefore, range widely in size and scope, depending on the nature of the design project being undertaken. A typical review may take in patent searches, legal reports, analogous product information, statistical data, government and private bodies' reports and market trends' data (Milton and Rodgers, 2013:50;179).

In order to support the design process of our toy proposal, which is an example in terms of new product design and/or product development, with academic/technical information infrastructure and to reach the necessary data, academic studies prepared in a number of specialties were examined. In cases where this is not possible, some data from institutional and/or commercial websites, virtual dictionaries, some periodicals, etc. non-academic sources on the internet have been also used occasionally, in order to get a general idea. Apart from this, internet search was mostly used both to reach some sources in the academic literature and to reach visual data that will exemplify some of the sub-topics of our thesis. In the research on which products are similar to our toy proposal in the market, some similar/analogous product images were reached in this way.

Thus, it has been tried to give an idea about various subjects related to each sub-title of the thesis content in many contexts such as descriptive, chronological, technical, interpretive, and to introduce approaches, methods, results and findings related to these subjects. Another important aid of the literature review was to provide a source for the identification, derivation and evaluation of some user preferences (and therefore possible product features) regarding our toy proposal for online surveys.

3.3. Design Process: Realisation and Testing of Design Ideas

In line with some design gaps identified in the field of aquatic toy design as a result of our personal observations and research, a mind map was prepared at the end of the brainstorming carried out to determine our possible design concepts. Milton and Rodgers (2013) briefly define a mind map as “A visual representation of hierarchical information, made popular by the psychologist Tony Buzan, and intended to present words and ideas in a way that engages both sides of the brain” (Milton and Rodgers, 2013:179). Next, some quick hand sketches were drawn by using the design ideas obtained from this. At last, two design ideas were selected for the finale, based on the designer’s personal preference. Both were modeled in a 3D virtual environment and one of them (Viking ship) was determined as the implementation project of the study due to the characteristic, historical and cultural infrastructure on which the background is based in terms of the design researches carried out. The main reason for this choice, as mentioned before, is that the character design of our aquatic toy proposal to be designed is inspired by a well-known television production, the cartoon Vicky The Viking. In this way, it is aimed to increase the preferability of our toy proposal by attracting the attention of children and their parents (see: 4.1.4. 3D CAD Modeling). Developing and presenting a single design idea to the participants is the result of a choice to limit the design process to a certain framework, both for the reasons stated above and due to the time constraint of the entire study.

The selected design idea was embodied within the possibilities by using PE foam-based pool noodles, as the main building materials, and various temporary/demo materials, such as colorful PVC pipes, MDF, hard cardboard insulated with oil paint, nylon ropes. Some essential hand workmanship methods such as sawing, carving, gluing, dyeing, tying using elastic textile strips and nylon ropes were used as shaping, assembling and decorating techniques during the physical modeling processes (Fig. 30). The resulting products are a small-scale model of our toy proposal and also full-size model (mock-up) trials of the hull and keel (see also: 4.1.6. Full-Size Prototype Production Trials of the Boat Hull).



Figure 30. Some of forming and joining techniques used in modeling: sawing work and tying with rope

(Modeling and Photos: Merter Yalçinkaya, 2020)



Figure 31. Trailers from the bodystorming phases performed in the studio and in a puddle

(Photos: Merter Yalçinkaya, IzTech Campus Area, Jan. 2020)

The first use trials of the prepared full-size hull model could not be made with child users due to the global Covid-19 pandemic conditions. Instead, the first use trials with the “bodystorming” method were conducted by an adult (by the designer/researcher himself), both in the workshop and in the aquatic environment. Aquatic environment experiments were carried out in natural seasonal puddles formed in the mountainous part of the IzTech campus in January 2020, and the process was recorded with video and photo shoots (Fig. 31). Bodystorming is defined as “a research method in which a design team attempts to physically recreate a situation through role-play, in

order to better imagine its social and physical considerations” (Milton and Rodgers, 2013:178). According to Milton and Rodgers, bodystorming offers a useful method that supports empathic working, idea generation, and prototyping. In this method, a situation is tried to be physically experienced by the designer/s in order to derive new ideas, especially in solving social and spatial design problems. The main purpose of this method, which is relatively easy to apply, is the physical actuation of the design proposition. For this, first the tasks to be tested in the session are determined. Observational details such as difficulties, surprises, and interesting discoveries experienced during the testing of these tasks are verbalized. If more than one designer attended the session, the observations of the others are also noted. In this way, benefits such as empathizing and developing alternative ideas can be achieved in processes such as idea generation and prototyping (Milton and Rodgers, 2013:106).

3.4. Field Studies

Due to the Covid-19 global pandemic, it was possible to carry out field studies, which were aimed to be carried out with face-to-face interviews and semi-structured surveys in the first place, only through structured online surveys. For this purpose, three separate survey studies were prepared and applied for the expert group consisting of child users, their parents and educators working in various branches of child development. Child and parent participants participated from 9 provinces, namely Adana, Ankara, Eskişehir, İstanbul, İzmir, Kocaeli, Konya, Manisa and Yalova. 25 children (9 girls, 16 boys), 26 parents (20 women, 6 men) and 6 experts (6 women) participated in the surveys.

Surveys consisting of a combination of multiple choice and some open-ended questions were used for child users and their parents. All questions of the expert survey consist of open-ended questions. After a series of preparatory questions in all three survey groups, the toy proposal with Viking ship concept was introduced to the participants through the visuals of CAD models and a small-scale model made of a combination of PE foam material and demo materials. Due to the nature of the structured online survey method, some features and/or criteria for the product were predetermined by the researcher. In determining some of these product features or design criteria, the literature on “new product design” and “product development” has

generally been used (Ulrich and Eppinger, 2000; Crawford and Di Benedetto, 2003; Milton and Rodgers, 2013 etc.). Another part of them was compiled from some studies on toys in general. The studies conducted by Çiçek (2011), Bolışık et al. (2014), and Sakar and Karaduman (2017) on “consumer behavior” in general, have been particularly guiding in the preparation of our parent survey. In addition to those mentioned, it can also be said that some methods and/or ideas obtained from the studies of Adak Özdemir and Ramazan (2012) and Budak (2016) contributed to the preparation of child and expert surveys (see also: Adak Özdemir and Ramazan, 2012; Budak, 2016). Then, these features/criteria or structures derived and/or compiled for the proposed product in all three surveys were given as multiple-choice question options to find out how often participants preferred them.

In the survey forms, clear questions and instructions were used as much as possible. In the acquisition of demographic data, the personal sensitivity of the participants was tried to be taken into account. Particularly in the children’s survey, interesting and introductory images (such as photos and video trailers) were added to the section titles, considering the possibility of the children getting bored. Some of these images were also added to the child survey as well as the parent and expert surveys, for concept and product promotion. Again, in order to keep the children’s interest alive, care was taken to use an entertaining and/or motivating expression language throughout the child questionnaire.

3.4.1. Online Child Survey

The online child survey was presented to the participants under the title of “Yeni Bir Su Oyunağının Tasarım Önerisi İçin Havuz Makarnalarının Kullanım Potansiyelinin Araştırılması (Çocuk Kullanıcılar)”. At the entrance, there is an explanation text stating the purpose of the survey and the targeted age range. In the statement, guidelines are given that parents are expected to follow for the participation of children who cannot use a computer (App. A: Fig. 43).

The online child survey question set consisting of 35 questions is shown in App. A: Table 22 and Table 23.

3.4.2. Online Parent Survey

The online parent survey was presented to the participants as “Ebeveyn Anketi: Yeni Bir Su Oyunağının Tasarım Önerisi İçin Havuz Makarnalarının Kullanım Potansiyelinin Araştırılması”. At the entrance, there is an explanation text stating the purpose of the survey and the target audience (App. B: Fig. 44).

The online parent survey, like the others, begins with demographic questions. Demographic questions are often an important and indispensable element of any survey research. They provide the necessary clues to be able to make socio-cultural and socio-economic analyzes related to the research topic. In this section, information about the participants’ e-mail address, name, gender, age range, city of residence, parenting status, marital status, education status, occupation and employment status, total monthly income range of the family. Also the number of children aged 5-14 years and their age-gender information was asked (App. B: Table 26, Table 27).

The section called “Ebeveyn Soru Seti” consists of a total of 26 questions and introductory visuals. In this survey, some questions were asked as multiple choice and some as open-ended (App. B: Table 28, Table 29).

3.4.3. Online Expert Survey

The online expert survey was presented to the participants under the title of “Uzmanlar İçin Açık Uçlu Görüşme Soruları”. As in the other two surveys, the survey was started with an informative text on the purpose and content of the survey (App. C: Fig. 45). As a requirement of the online survey, e-mail information is requested. The first question is the part in which the participant briefly introduces her/himself. Along with this first question, the entire survey consists of 13 open-ended questions (App. C: Table 30 and Table 31).

CHAPTER 4

CASE STUDY

In this section, the part of the new product design process, from the concept determination/development stage to the visualization of the design idea and the production of the physical model, is tried to be exemplified by the design process of a rideable aquatic toy proposal.

4.1. Design Processes for a RAT Proposal

Our aquatic toy proposal subject to the study is, in its simplest definition, a toy boat whose structural main material is pool noodles and visually inspired by the ancient Viking warships and the cartoon series “Vicky the Viking” (see: 2.2.4.3.2. An Inspiring Concept from Popular Culture: Vicky the Viking). Our toy proposal can also be considered as a kind of sea bike in terms of its movement mechanism. Accordingly, a water wheel in the tail section of the toy is operated by a simple hand-spinning mechanism attached to the prow of the toy. The forward and reverse rotation of the waterwheel will create a driving force to make the toy travel linearly in both directions.

4.1.1. Concept Generation

Concept production of a rideable aquatic toy proposal is the first step of the design process. At this stage, after an individual brainstorming, the design elements and criteria such as the cultural and historical inspiring start points, the possible materials to be used, some ergonomic features of the product, were determined by visualizing them through a mind map (Fig. 32).

4.1.2. Freehand Sketching

Various thematic free hand sketches were drawn, based on the ideas that came to the fore in the concept or mind map created as a result of individual brainstorming. At this stage, due to the exploratory nature of the concept generation process, a restrictive approach was tried to be avoided in drawing the initial sketches. Thus, various rapid ideation sketches were produced. As a result, two design ideas with their carrier hulls made from PE pool noodles were selected and visualized with thematic sketches. The biggest benefit of this preliminary study is that it provides valuable foresights about what the toy proposal to be designed will look like in terms of shape, what suitable materials can be used, what the functional properties of the toy will be (Fig. 33).

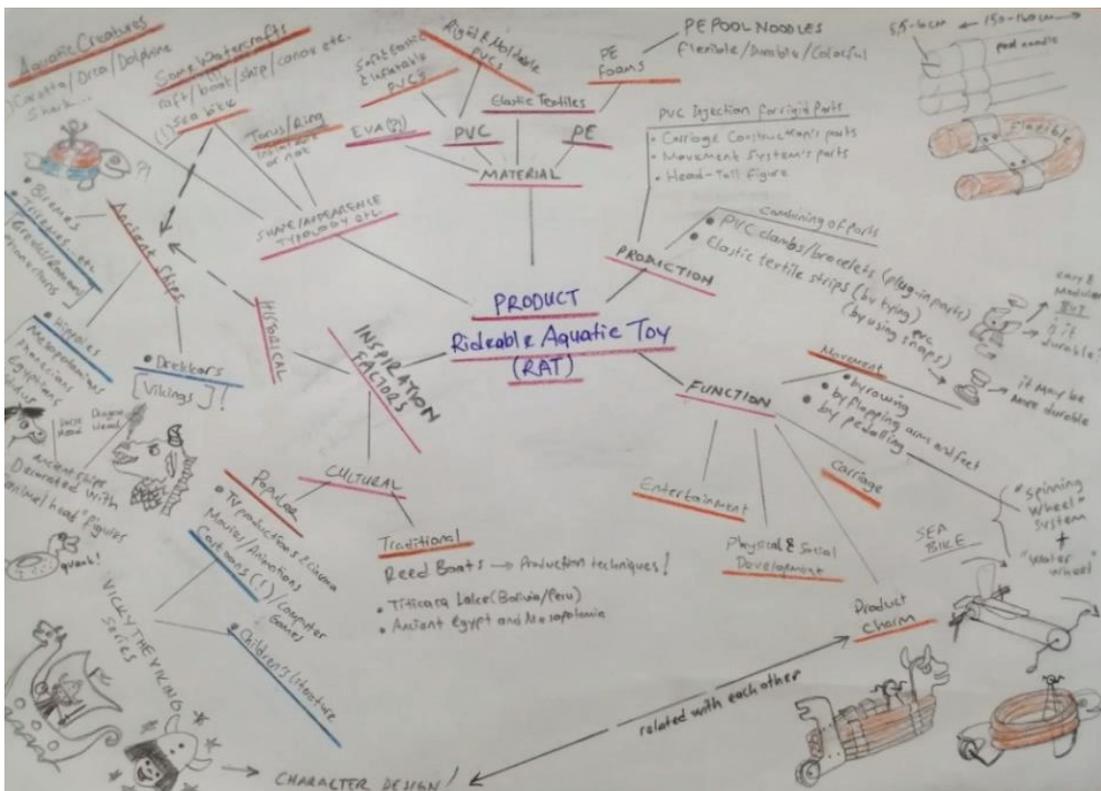


Figure 32. Mind map prepared after the brainstorming in the concept generation process



Figure 33. Thematic freehand sketches drawn for rapid visualization

4.1.3. Analogous Product Research

During the internet searches, which continued in parallel with the concept determination and sketch drawing studies, it was also searched whether there were products with similar material, form and usage characteristics with our toy proposal. Images of some commercial and/or amateur-made aquatic toys in various shapes such as raft, canoe, floating seat, bagel made with PE pool noodles were found. One of them has the same shape as the carrier hull of our toy proposal, thanks to the use of pool noodles to form a ship hull in terms of stacking. The difference of this example from our example is that the pool noodles are longer in length and more in quantity. Supporting the lower part of the hull with more pool noodles causes the sitting space to stay above the water, thus preventing water from entering the hull through the gaps of the noodles forming the hull. Its size allows this example to be used by multiple users at the same time. Our toy proposal differs from the mentioned example in that it is a single-person, it has a carrier spine with a dragon's head and a tail, and it has a kind of manually operated pedalo-like motion mechanism (Fig. 35).



Figure 34. Other products similar to our toy proposal in terms of material and/or hull shape

(34A-Source: URL-25) (34B-Source: URL-26)
 (34C-Source: URL-27) (34D-Source: URL-28)

4.1.4. 3D CAD Modeling

At this stage, two design ideas selected among free hand sketches were tried to be modeled in three dimensions in a virtual environment by means of a CAD program. It can be said that this part of the design process proceeds almost in parallel with the production trials of the full-size draft hull mock-up made from the target material. The 3D drawing and modeling program used in the visualization of selected design ideas is Fusion 360, known as a “cloud-based” and “parametric” software of AutoDesk (see: 2.2.4.4.2. 3D Visualization with CAD/CAM Methods).

As with many three-dimensional design programs, modeling in Fusion 360 is usually started with the drawing of two-dimensional sketches prepared based on the physical dimensions of the product to be designed. In almost all three-dimensional drawing programs that work with a similar logic, there are control consoles in which various drawing tools are lined up in the two-dimensional workspace for this stage. Then, in the solid and surface modeling parts of the program, these two-dimensional sketches, which appear more like technical drawings, are intervened with the 3D modeling and surface creation tools of the program, and the physical and/or solid

modeling of the design is performed in the virtual environment. Such design programs, which allow the transition from two-dimensional drawing to three-dimensional modeling, are also described as “hybrid programs” in this sense. Fusion 360 is also compatible with CAM technology. Digital data of the created design in a certain format are processed by 3D printers, allowing the production of physical models and/or prototypes within certain size and material conditions (For more on Fusion 360 see: Autodesk Inc., 2020).



Figure 35. 3D modeling of two design ideas in a virtual environment
(Design Ideas and Modeling: Merter Yalçinkaya, Dec. 2019)

4.1.5. Material Selection

Due to their technical advantages mentioned in before chapters, PE foam-based pool noodles, which exhibit the potential to be suitable structural materials for the design of an industrial and rideable aquatic toy, have been determined as the main construction materials of the toy hull. The assumption/idea that a new aquatic toy proposal to be produced from PE pool noodles could be an alternative to inflatable aquatic toys made from PVC also plays a role in this determination. In case our toy proposal turns into a possible end product, it will be necessary to produce a carrier keel system that holds together the PE pool noodles, which are determined as the main structural material, and the movement mechanism. In that case, it would be more convenient in terms of durability and functionality, if the keel consists of hollow modules manufactured by molding from hardened PVC. The same type of PVC

materials can also be used as suitable construction materials in the production of parts of the toy's movement mechanism. Apart from this, in order to ensure the structural connection of the pool noodles with each other and with the carrier keel and the movement system, elastic synthetic textile strips with PVC poppers and/or velcro-bands will be used as clamps. The use of these bands provides an advantage in terms of easy disassembly and assembly of the product, on the other hand, it may also cause a disadvantage such as crushing and/or deformation of the PE foam in the junction areas of the toy due to these assembly processes that will be repeated many times by the users. On the other hand, the use of fixed type elastic textiles, as in the production trial of our full-size hull model, will cause that the product is not disassembled, but will result in a stronger and safer hull integrity. This assemble method, it can also offer a more robust and therefore safer joining alternative to clamp pool noodles compared to the rigid PVC connectors available in the market (Fig. 36). In summary, it is foreseen that, thanks to the elastic structures of these strips/bands, they will be able to more easily tolerate the stresses and fragmentation that may occur in the toy while in the water due to the weight of the user.

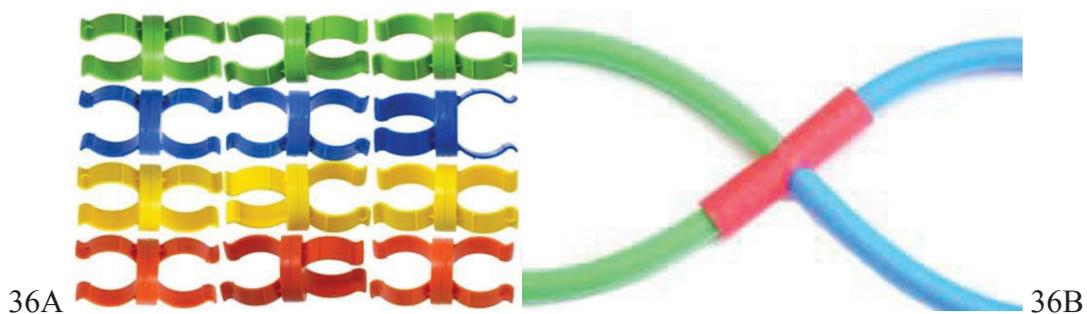


Figure 36. Some rigid PVC connectors in the market

(36A-Source: URL-29) (36B-Source: URL-30)

4.1.6. Full-Size Prototype Production Trials of the Boat Hull

Our toy proposal has been designed with a modular approach in terms of product architecture. Ulrich and Eppinger (2000) define product architecture as “The architecture of a product is the scheme by which the functional elements of the product are arranged into physical chunks and by which the chunks interact” (Ulrich and

Eppinger, 2000:183). According to this, the physical elements of a product are formed by bringing together some physical building blocks in an organized manner. These building blocks, called “chunks” of the product, consist of other components, each of which performs various functions of the product. In this sense, concept of modularity is considered as one of the most important features of product architecture. Accordingly, in the modular product architecture, the parts that constitute the product can fulfill one or a few functions in their own structural integrity. The interactions of these parts with each other are well defined and are often fundamental to the primary functions of the product. Thus, a functional modular product architecture allows a design changes to be made in one chunk without requiring changes to other chunks for the product to operate properly. In this respect, modular product architecture differs from its opposite, integrated product architecture. In an integrated product architecture, the interactions between chunks are not clearly defined. Also, a change in the design of one chunk of the system may cause the designs of other chunks to change. Again, according to Ulrich and Eppinger, being modular and/or integrated is also a relative feature in terms of product architecture. In other words, a design product may not always have a completely modular or integrated structure. Then, it can be said that one product has a more or less modular and/or integrated architecture compared to another (see also: Ulrich and Eppinger, 2000:182-185).

Like many primitive watercraft mentioned in the previous chapters, it is known that the boats made of reed also developed in various times and in different geographies with their various forms. Apart from the formal differences and/or similarities, it can be said that these boats are mostly produced with similar stacking and assembly mentality. It is the essence of the construction techniques of reed boats that a large number of water reeds are tied with binders such as rope, striped bark or leather strip to form a floating mass in tight bundles.

The idea of forming the carrier hull of our toy proposal from pool noodles is primarily a choice related to the fact that the pool noodles are made of low density polyethylene (LDPE) foam material with a closed cell structure and their soft and long cylindrical shapes that can be substantially bent. Thanks to these physical properties, pool noodles exhibit the appropriate potential to adapt the traditional production techniques of reed boats to aquatic toy design with a contemporary interpretation of materials.

For the construction of the carrier hull of our toy proposal, a joining technique similar to the one above was taken as an example. Accordingly, two rows pool noodles, which contain 14 items, 7 on the left, 7 on the right sides, constitute the shipboards of the toy boat in the typical shape of a Viking ship (the outer sides of the hull are called “shipboard”). In order to construct and/or hold together this structure, which will form the hull in the full-size model, in the form of a boat, at the first stage, 2 bow frames (Eng. “timber”) and 1 middle frame were produced from solid MDF as demo material. Slots/cavities were carved on each post (or frame) to accommodate 6 cm diameter pool noodles. It was planned to fix the pool noodles to these structural elements by means of rope and elastic textile strips. Considering that the final product will be assembled by the end user, it was foreseen by the designer that this is not the most practical method, but may be a more suitable option in terms of durability. However, during the in-water use trials of the full-size draft model assembled with this method, it was observed that these structural elements could not withstand the physical stresses on the hull properly and warped when weight was added: In order to increase the strength of the full-size body model before the assembly phase, it was planned to pass colorful PVC pipes with a diameter of about 2 cm through the center of each noodle. Each of them had to be hand-carved, as there was no channel running through the centers of the noodles supplied. Since this is not possible for full-size (160 cm) noodles, the noodles were cut in half in the middle and they were carved through their centers with a kind of hand-carving tool. After passing PVC pipes through them, both half noodles were reconnected via rigid PVC water pipes 6,5 cm in diameter and 25 cm in length. These pipes provide a kind of clamping task by compressing the noodles from their joints. However, this time, the pipes with a diameter of 2 cm, which are expected to provide extra strength, created unavoidable stresses during the assembly processes, causing the typical ship form to be given to the hull to deteriorate (Fig. 37). In addition, it has also been observed that using the demo materials at this stage of the construction of the full-size PE noodle hull, the other parts that need to be added to design will make the draft design quite cumbersome and heavy. Therefore, in the next assembly attempt, the center support timber made of MDF in the form of a frame and colored PVC pipes with a diameter of 2 cm passing through the noodles were excluded from the project. Figure 38 shows the final state of the full-size hull draft.

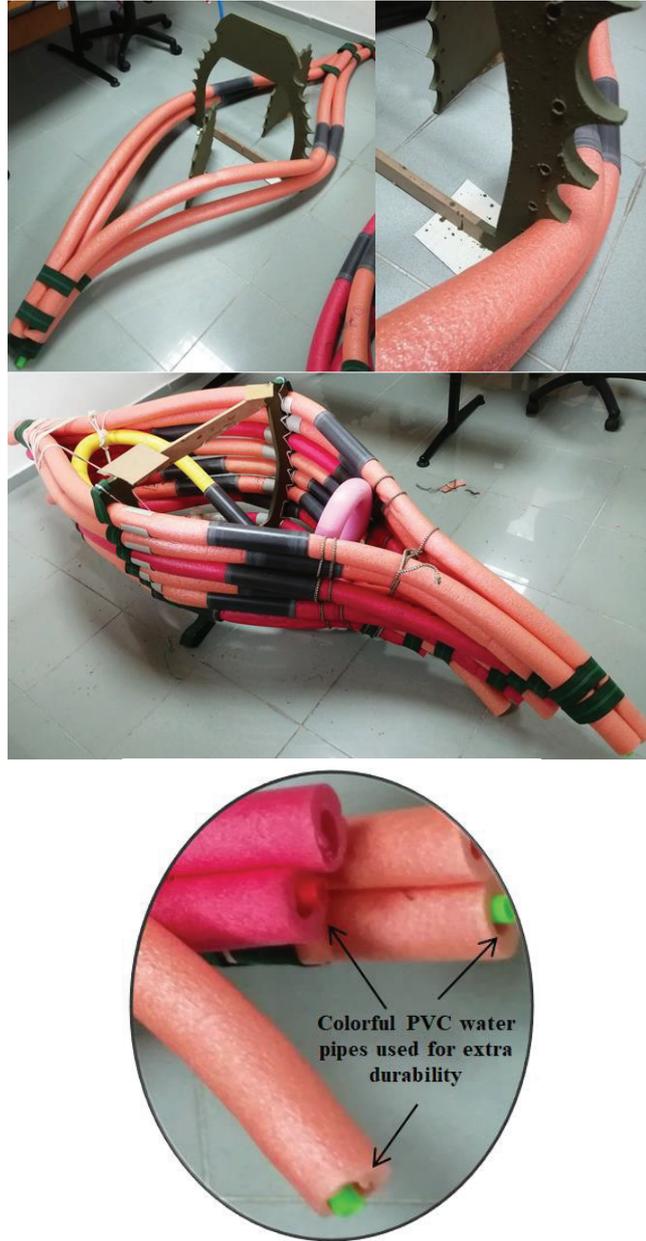


Figure 37. Full size hull mock-up reinforced with water pipes and MDF frame
(Mock-up & Photos: Merter Yalçınkaya, IzTech Campus Area, Dec. 2019)



Figure 38. Full-size hull mock-up in its current form

(Mock-up & Photo: Merter Yalçinkaya, IzTech Campus Area, Dec. 2019)

Next, the carrier/connecting keel, including the dragon head shaped prow ornament and tail section of the draft toy, were formed using a combination of oil-painted rigid cardboard and rigid PE foam panel for waterproofing. However, since some technical impossibilities/difficulties such as transportation and assembly problems experienced in combining the keel made of demo material with the PE hull could not be eliminated within the available conditions, the production trials of the full-size model were completely terminated at this stage (Fig. 39). Instead, it was decided to proceed with a scaled-down model, which at least represents the full-size model (mock-up)

planned to be produced (Fig. 40). The visuals of this small size model and 3D virtual modeling were used to introduce our toy proposal to the participants during the field studies.



Figure 39. Trial models for keel system decorated with a dragon's head
(Mock-ups & Photos: Merter Yalçinkaya, Dec. 2019)



Figure 40. A scaled-down model of our toy design proposal
(Model & Photos: Merter Yalçinkaya, Dec. 2019)

CHAPTER 5

FINDINGS

It is possible to examine the findings obtained throughout the study in two main groups: data from physical use trials of the full-size hull model made from PE noodles and data from online field studies.

5.1. Findings of the Full-size Hull Model Usage Test

During the usage trials of our toy proposal, it was observed that the full-size draft hull of the toy boat, made of PE pool noodles and with a trial length of approximately 212 cm, could easily carry even an adult person on water (In this experiment, the water depth was approximately 70-80 cm; the test subject's height was approximately 185 cm, and his weight was 65-70 kg). The trial was conducted in 70-80 cm deep water (Fig. 41). In a video fragment about a similar usage experiment we came across on the internet during our literature search, it was seen fact that another toy canoe made from PE pool noodles and designed with the same hull structure as our example successfully floated its users on the water. The difference between the example seen here and our draft hull is that the pool noodles used for the other design are longer and more. In this design, the noodles that are used extra support the bottom of the boat. Thus, it provides more buoyancy and a more balanced float on the water. In our example, unlike the other example, considering that our full-size hull model made for the test can easily keep an adult on the water without extra pool noodles for support to the hull, it is understood that it will be able to float child users on the water even more easily (Fig. 41, Fig. 42). However, if needed, similar additions to the hull design may be required to provide better buoyancy and oscillation balance on the water.

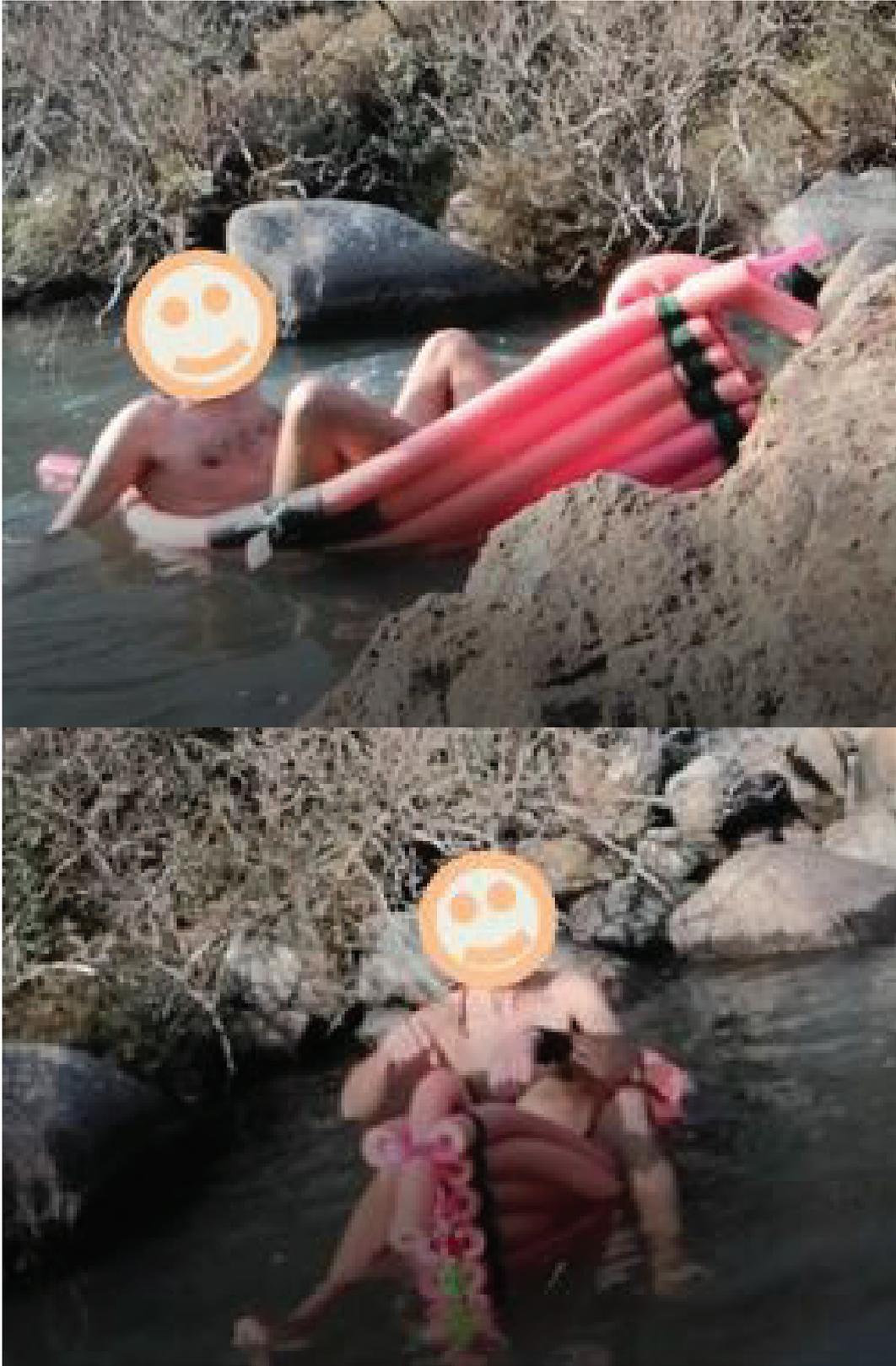


Figure 41. Snapshots from user trials on water of our full-size draft hull
(Photos: Merter Yalçinkaya, İzTech Campus Area, Jan. 2020)

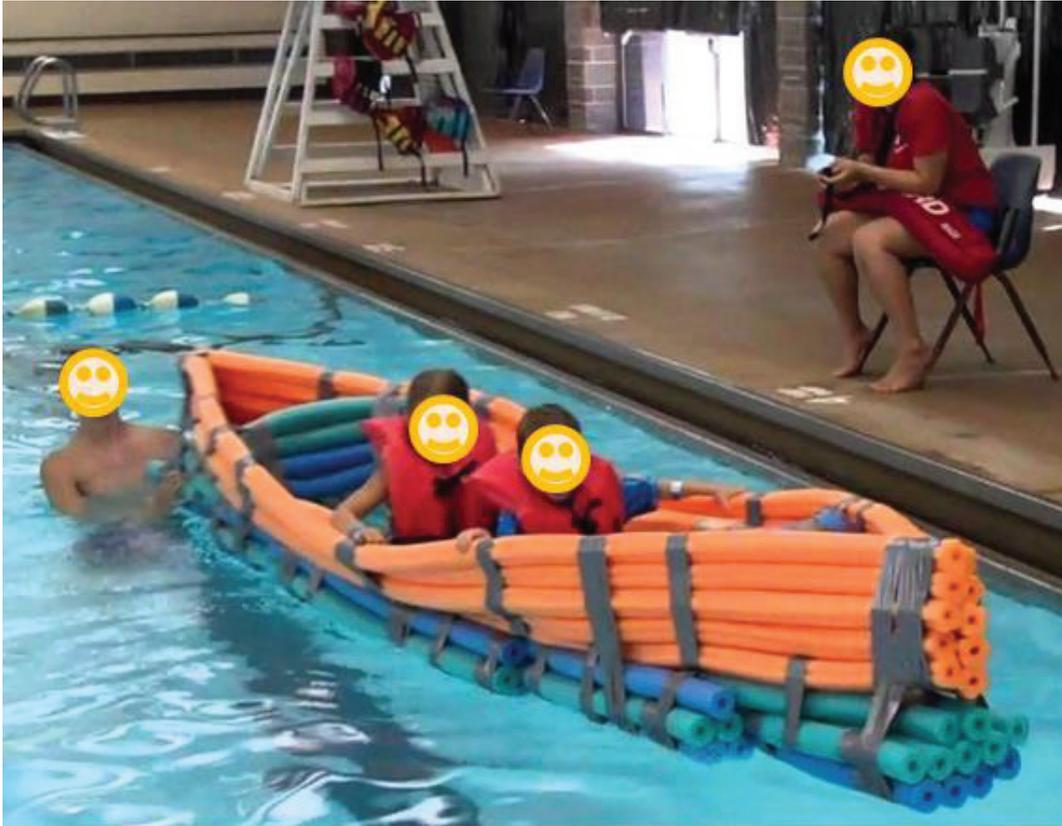


Figure 42. A snapshot of “YES Camp 2013 Noodle Canoe” video on the internet
(Source: URL-31)

5.2. Findings of the Online Field Studies

As mentioned earlier, fieldwork consists of online surveys for child users, parents, and expert participants (ChiS/ParS/ExpS).

5.2.1. Findings of the Online Child Survey

In the demographic data section of the child survey, e-mail address (as a requirement of the online survey), name, gender, age, height, weight, and city information of the participants were asked. Accordingly, 25 children (9 girls, 16 boys) from 9 provinces (Adana, Ankara, Eskişehir, Istanbul, Izmir, Kocaeli, Konya, Manisa and Yalova) participated in the survey. The approximate average age was found to be 8 years for girls and 9 years for boys. While the average height of the girls was

approximately 130 cm and the average weight was approximately 29 kg, the average height of the boys was approximately 137 cm and the average weight was approximately 34 kg. The age gaps of the children according to their genders were as follow:

Table 2. Age ranges of the participants in the child survey (ChiS) by gender

Age Range	Girl	Per.	Boy	Per.
5-6 years	3	12%	5	20%
7-11 years	6	24%	9	36%
12-14 years	---	---	2	8%
TOTAL	9 girls	36%	16 boys	64%

It is observed that some anthropometric developmental values found according to the general average age of the girls and boys participating in our study show some similarities and differences with the data of Neyzi et al. (2008). According to this, while the anthropometric developmental values of girls in the same age group were closer to each other in both studies, the data of boys in our study were slightly higher than the data of the aforementioned study (see App. E). The main difference between the data of our study and the data of Neyzi et al. (2008) is that the general averages according to gender in our study were obtained from children in different age groups. The findings of the other study, on the other hand, can separately represent the averages of certain age groups on the basis of both genders, thanks to the advantage that the number of participants is higher than in our study. The difference in the data, especially of boys, is most likely a result of this situation.

The 7-part main question set of the survey includes 35 questions in total. In the first part, consisting of 4 questions, children's preferences for rideable toys in general, their ability to use these toys, and their interest in water and transports used on water were asked. The aim here is to understand the developmental competency levels of the participants, called "readiness" by child development experts. In a way, this section can also be considered as a preparatory section in which children are warmed up to the subject. Thanks to the open-ended answers given by the children, 29 types of toys were determined in the 1st question that formed the children's perception of rideable toys.

Accordingly, the frequency of the answers given by the participants to the “5 rideable toys that come to mind first” is shown in Table 3:

Table 3. Answers of the ChiS’s 1st question
 “What are the 5 rideable toys that come to your mind first?”

No	Items	Freq.	Per.
1	Bicycle	19	76%
2	Scooter	14	56%
3	Battery car	13	52%
4	Skateboard	11	44%
5	Skate	10	40%
6	Sled	9	36%
7	Hoverboard (electric skateboard)	4	16%
8	Battery motorbike	4	16%
9	Boat/canoe	3	12%
10	Ski	3	12%
11	Seabed	3	12%
12	Pool noodles	2	8%
13	Sea ring	2	8%
14	Marine engine/jet ski	2	8%
15	Single wheel	1	4%
16	Walker	1	4%
17	Arm bant	1	4%
18	Life jacket	1	4%
19	Sea ball	1	4%
20	Yatch	1	4%
21	Fire truck	1	4%
22	Ambulance	1	4%
23	Crane	1	4%
24	Digger	1	4%
25	Bus	1	4%
26	Tractor	1	4%
27	Airplane	1	4%
28	Washtub/basin	1	4%
29	Swing	1	4%

Options for some questions are given according to the 5-point scoring system (Likert Scale): Across the survey, “1st level” represents the lowest score or most negative opinion/comment, while “5th level” represents the highest score or most positive opinion/comment. Accordingly, in the 2nd question, it was understood that 92% of the participants had a high level of proficiency in using rideable toys suitable for their age (at 4th and 5th levels). Similarly, in the 3rd question, it was seen that 96% of children liked to enter the water and/or have fun in the water.

The frequency of the preferences in the 4th question, where the 5 most popular sea vehicles are asked, is as in Table 4:

Table 4. Answers of the ChiS's 4th question
 "What are your 5 favorite watercrafts/vehicles?"

No	Items	Freq.	Per.
1	Speedboats (jet skis, hovercrafts, etc.)	14	56%
2	Large boats (passenger and warships/boats, etc.)	12	48%
3	Sea bikes	12	48%
4	Sailboats (yachts, catamarans, small training sails, etc.)	9	36%
5	Underwater motorcycles	9	36%
6	Submarines	8	32%
7	Small boats (canoes, dinghy/rowboats, etc.)	7	28%
8	None of them	2	8%

In the following questions (5th-15th questions), children's perceptions of rideable aquatic toys and some of their experiences with these toys were tried to be learned as an overview. Accordingly, in the 5th question, while 60% of the participants (15 children) had a rideable aquatic toy, 40% (10 children) stated that they had never owned such a toy. In the next questions, variables such as the type, material, shape, size, ease of carriage and mounting/demounting status of their toys were asked to the participants who had experience with aquatic toys. Among the types of rideable aquatic toys, sea rings (24%=6 children), sea beds (24%=6 children), pool noodles (16%=4 children) and sea bikes (8%=2 children) are prominent open-ended answers to 6th question.

In the 7th question, 16 participants (64%) stated that their favorite types of aquatic toys were mostly made of inflatable PVC, 6 participants from rigid PVC and 3 (12%) participants from polymer foam-like materials.

The toy shapes defined in the 8th question are mostly listed as animal species (20%=5 children), seabed (16%=4 children), geometric shapes (12%=3 children), bagel/ring (8%=2 children) etc. Other answers are colored rod (4%=1 child), boat (4%=1 child), skateboard (4%=1 child) and seat (4%=1 child). 7 children (28%) did not answer this question.

In the 9th-11th questions, children were asked about some features such as the size, modularity and portability of their favorite aquatic toys. Accordingly, in the 9th question, 3 participants (12%) defined the size of their toys as "too big/large" (at the 5th level). 4 participants (16%) answered this question as "slightly big/large" (4th level) and "medium size" (3rd level). While 2 participants (8%) found the size of their toy "slightly small/narrow" (2nd level), 1 participant (4%) stated the size of her/his toy as

“too small/narrow” (1st level). In the 10th question, 5 participants (20%) have toys that can be disassembled, while 14 participants (56%) stated that their toys cannot be disassembled. For the 11th question, 15 participants (60%) stated that they could easily carry their favorite rideable aquatic toys. On the other hand, 2 (8%) participants “because it is big”, 1 participant (4%) “because it is heavy”, 1 participant (4%) “because it is both big and heavy” has difficulty in carrying their aquatic toys alone. 6 participants (24%) did not answer these last three questions.

In the 12th question, 6 of the participants (24%) made their own choice in the purchase of rideable aquatic toys, while 8 participants (32%) made their choice together with their parents. One of the participants (5 years old girl) stated that her toy was not her choice, while 4 participants (16%) did not remember it. 6 participants (24%) did not answer this question. When the toy choices made by the participants individually and with their families are evaluated as a whole, it is understood that the age increase factor does not have a clear effect on the individual choices of the children. 5 of the 6 participants, who stated that they chose the aquatic toys themselves, are between the ages of 7-13. On the other hand, 6 of the 8 participants who choose toys with their families are between the ages of 9-11. Therefore, a meaningful result could not be reached from the data that can be evaluated as “head-to-head” of 14 participants who stated that they “made a choice” in this question in one way or another. Although they are in the age group where they are expected to make their own choices, two possibilities come to mind in the case of children who choose their own aquatic toys with their families: The first is that the participants in this group have more authoritarian parents and/or the exchange of ideas within the family is a little more directing/determining. In the second case, it may come to mind that the participants do not yet have the competence to make their own choices directly, despite their age.

According to the data of the 13th question, 5 participants (20%) “feel safe using any rideable aquatic toy” at “quite high”, 6 participants (24%) “high” and 8 (32%) participants at “medium” levels. No one ticked the “low” and “never” options in this question. Again, 6 participants (24%) did not answer this question.

In the 14th question, the most popular 5 characteristics of rideable aquatic toys were asked open-ended. The frequency of the answers given is shown in Table 5.

Table 5. Answers of the ChiS's 14th question
 "What are your 5 favorite features of rideable aquatic toys?"

No	Comments of Children	Freq.	Per.
1	"the toy's ability to float/move/not sink in water"	12	48%
2	"its being fun"	10	40%
3	"its being colorful"	8	32%
4	"its being safe/protective/balanced"	6	24%
5	"its being comfortable/relaxing"	6	24%
6	"its being soft/puffidic/bloated"	5	20%
7	"its being fast"	4	16%
8	"to have a beautiful shape"	3	12%
9	"its being portable/it takes up little space"	3	12%
10	"to have underwater window/sunshade"	2	8%
11	"its durability"	1	4%
12	"its ease of use"	1	4%
13	"being fit to play with friends"	1	4%
14	"to be in contact with water"	1	4%
15	"variety of toys"	1	4%
16	"to be educational of the toy"	1	4%
17	"fit to jump"	1	4%
18	"its being sporty"	1	4%
19	Missing Answer: "none/---"	4	16%

In the 15th question, 6 of the participants (24%) preferred single-person aquatic toys, while 19 (76%) preferred aquatic toys that they could ride with their friends.

For the 16th question, 12 participants (48%) stated that they would like "quite a lot" to have an inflatable aquatic toy that will be purchased for them by their parents (at the 5th level). Respectively, 4 participants (16%) stated that they would like this at the 4th level, 6 participants (24%) at the 3rd level and 3 (12%) at the 2nd level.

Participants indicated a wide variety of what type of inflatable toys they wanted in the 17th question. Accordingly, 2 participants (8%) preferred inflatable toys in the form of boats and 2 participants (8%) in the form of a ship/viking ship. The other 12 toy shapes were listed as pool, house, mermaid, unicorn, jetski, dining table, banana, seabed, flamingo, dinosaur, flower and car. On the other hand, 5 participants (20%) gave answers such as "triangle in the front, round in the back", "portable and single", "big and wide", "high sided", "round". 4 participants (16%) did not answer this question.

In questions about pool noodles (18th-20th questions), 22 participants (88%) stated that they used pool noodles, while 3 participants (12%) only saw them. Accordingly, the words and/or expressions participants use to describe what pool noodles look like are: "sponge/spongy" (48%=12 children), "foam" (36%=9 children), "petroleum/plastic" (24%=6 children), "spaghetti/noodle-like" (16%=4 children),

“long” (16%=4 children), “thin” (8%=2 children), “rod-shaped” (8%=2 children), “coloured” (4%=1 child), “soft” (4%=1 child), “flexible” (4%=1 child), “flat” (4%=1 child), “silicone” (4%=1 child), “like a swordfish” (4%=1 child). The children’s experiences with pool noodles were determined as “I used it to stay afloat while learning to swim” (48%=12 children), “I used it to play or have fun while in the water” (76%=19 children), “I used it as an aid equipment while doing sports or exercises” (8%=2 children), “I never used it” (8%=2 children). In this question, none of the children choose the option “I used it as a material while doing school or hobby projects”.

The next part consists of questions about rideable aquatic toys made from pool noodles (21th-24th questions). Accordingly, 19 participants (76%) stated that they had never seen/used a rideable aquatic toys made of pool noodles. 4 participants (16%) stated that they only saw this kind of toy, while 2 participants (8%) stated that they both saw and used it. The answers given by the participants who saw or used this type of toy to the question “what did the toy look like?” are as follows: “I used it as a swimming board” (4%=1 child), “I merely saw it and it was shaped like a house” (4%=1 child), “It looked like a bagel” (4%=1 child), “It was in the shape of a rectangular plate” (4%=1 child). 2 participants (8%), who said they had seen this kind of a toy, left this question blank. Again, in a multiple-choice question prepared for participants who had seen and/or used such a toy before, they were asked how they felt during this experience. The options given to them in the question are: “fear”, “excitement”, “fun/joy/happiness”, “passion for speed”, “liking”, “safety”, “self-confidence”, “ease of use”, “desire to explore”, “desire to own”, “comfort”, “sense of freedom”, “like being on an adventure” and “I’ve never seen/used”. 5 participants (20%) gave conflicting answers to this question, probably because they did not understand the question instruction well. Therefore, 5 answers were considered invalid. The distribution of these 16 options given in the question in 20 valid answers is as in Table 6:

Table 6. Answers of the ChiS's 23rd question
 "How did you feel if you saw or used a rideable aquatic toy made from pool noodles?"

No	Feelings/Sensations	Yes	No
1	Fear	1	19
2	Ease of use	3	17
3	Sense of freedom	3	17
4	Excitement	4	16
5	Safety	4	16
6	Desire to explore	4	16
7	Comfort	4	16
8	Fun/joy/happiness	5	15
9	Passion for speed	5	15
10	Liking	5	15
11	Self-confidence	5	15
12	Desire to own	5	15
13	Like being on an adventure	5	15
14	I've never seen/used	14	6

(Selection frequencies determined for 20 valid answers)

In the last question of this section (24th question), 20 participants (80%) wanted to have a rideable aquatic toy made of pool noodles, while 1 participant (4%) did not want this. On the other hand, 4 participants (16%) were undecided on this issue.

The next questions (25th-27th) were asked to find out how the children felt about the character-designed products and whether they recognized the "Vicky The Viking" productions, the source of the character design of our toy proposal. Accordingly, 21 participants (84%) stated that they liked toys related to cartoons, animated films or comic book characters, 3 participants (12%) did not like them, and 1 participant (4%) was undecided (25th question). 23 participants (92%) stated that they knew about Vikings and their ships, 2 participants (8%) stated that they did not know them (26th question). 11 participants (44%) watched only the cartoon version of Vicky The Viking, 1 participant (4%) watched only the animated version, 6 participants (24%) watched both the cartoon and animation version, and 1 participant (4%) watched all versions including the cinema (27th question).

Afterwards, our toy proposal was introduced with 3D modeling images and model photos, and in the 28th question, the participants were asked how much they liked our toy proposal using a 5-point Likert scale (5: I loved it, 4: I liked it, 3: I neither liked nor disliked, 2: I disliked it a little, 1: I disliked it at all). The results are shown in Table 7:

Table 7. Answers of the ChiS’s 28th question
 “How much did you like the toy Viking ship whose model you see in the pictures?”

5 I loved it	4 I liked it	3 I neither liked nor disliked it	2 I disliked it	1 I disliked it at all
9 children (36%)	4 children (16%)	7 children (28%)	5 children (20%)	---
TOTAL: 25 children				

In question 29, when children were asked about their ideas about using our toy proposal in water, 14 children (56%) stated that they would like it very much, it would entertain them and they would feel safe. 8 children (32%) stated that they would very much like to try the toy in water, that it might be fun for them, but still they would not feel very safe. 3 children (12%) stated that they would not like such an experience, it would scare them and they would not feel safe at all.

In question 30, the frequency of the answers given when asked about the order of our toy proposal in the participant’s preference lists is as follows: “my 1st preference” (32%=8 children), “my 2nd preference” (12%=3 children), “my 3rd preference” (20%=5 children), “my 4th preference” (16%=4 children), “my 5th preference” (8%=2 children) and “none” (12%=3 children). Similarly, when the participants were asked which they wanted the most in the 31th question, 11 children (44%) preferred the “Viking ship made of pool noodles shown in the images”. 8 children (32%) answered as “an inflatable aquatic toy”, 4 children (16%) as “another rideable aquatic toy made of pool noodles” and 2 children (8%) as “none of them”. When the data of these two questions and the 28th question were evaluated together, it was determined that the answers of 9 participants (36%) were inconsistent within themselves. Accordingly, for example, a 10-year-old girl stated her level of liking for our toy proposal as “2: I did not like it” in the 28th question. Despite this, in the 30th question, she preferred the toy as the 2nd in the order of preference. The same participant again preferred our toy proposal among the options given in the 31st question. When these and similar inconsistent data are ignored, and the consistent answers given by the participants aged 7 and over are examined, considering their literacy proficiency, it is understood that 8 participants (32%) did not prefer our toy proposal (4 girls, 4 boys). 3 boys (12%) from the same age group consistently preferred our toy proposal in all three questions. It was determined that the answers of 6 participants (24%) in this age group were inconsistent (2 girls, 4 boys). Assuming that

children’s opinions are directly conveyed by their parents, it is seen that 2 boys and 1 girl out of 8 participants in the 5-6 age group consistently preferred our toy proposal for these three questions. Our toy proposal was not consistently preferred by 2 girls in this age group for the same three questions. The answers of the remaining 3 boys were evaluated as inconsistent. According to Zhang and Peng (2010), “Children always tend not to like many existing toys which are produced according to other people’s wish” (Zhang and Peng, 2010:1180). This view also explains, to some extent, the presence of children among the participants who do not prefer our toy proposal. It is also possible to see some reflections of this situation in the wide variety of answers given by children to our previous questions about aquatic toy typology.

In the 32nd and 33rd questions, the 5 most liked and disliked features about our toy proposal were asked open-ended. Because the answers given were in a wide variety, they had to be sorted into some categories. For this, first of all, the prominent keywords and/or concepts in the answers were tried to be determined first. For example, the “Size” category contains some features that were liked by some participants and disliked by others. Accordingly, the toy being “big/long” was defined as a feature liked by 4 children (16%), while it was defined as a feature that was disliked by 5 children (20%) due to “difficulty in carrying/storing”. Words such as “image”, “Viking ship/Viking symbol”, “sweet/beautiful”, “remarkable/interesting/original/different”, “aesthetic”, “historical” in 17 answers about the 5 most liked features, can be categorized as the “visual design of the toy” or “concept of the toy”. The categories determined according to the answers given and the frequencies of these answers are shown in Table 8 and Table 9.

Table 8. Answers of the ChiS’s 32nd question
 “What are the 5 things you like about this toy Viking ship?”

No	Categories	Answers	Freq.	Per.
1	Visual Design/ Concept	Image/Viking symbol/Prow/Beautiful/Nice shape/Sweet/Original/Different/Remarkable/Interesting/Aesthetics/Historical	17	68%

(cont. on next page)

Table 8 (cont.)

2	Reliability	To be safe/Feeling safe/I can feel safe	5	20%
3	Technical Features	I like the propeller /Fin/Hand pedal/ Tail/Seating area	5	20%
4	Entertainment	To be entertaining	5	20%
5	Size	To be big/long	4	16%
6	Lightness	Lightness/To be light	4	16%
7	Function A	To float in water/To stay on water surface/To be rideable	4	16%
8	Function B	Ergonomics/Working my arms while using/ Advancing when pedaling	3	12%
9	Color	To be colorful	3	12%
10	Multi-user (*)	I can ride with my friends	3	12%
11	Personal Use	To be for single person use	2	8%
12	Softness	To be soft	2	8%
13	Comfort	To be comfortable	2	8%
14	Sense of Adventure	To be adventurous/ Adventurous	2	8%
15	Ease of Use	Convenience	1	4%
16	Usefulness	To be useful	1	4%
17	Endeavor/Labor	Putting effort into the design of the toy	1	4%
18	Socializing	Being suitable for spending time with family	1	4%
19	Mountability (*)	To be detachable and mountable	1	4%
20	Missing Answer	---/I don't know and don't like Viking ship	2	8%

(*) The answers that do not comply with the toy characteristics given in the presentation part of the survey

Table 9. Answers of the ChiS's 33rd question
 "What are the 5 things you dislike about this toy Viking ship?"

No	Categories	Answers	Freq.	Per.
1	Visual Design/Concept	The black band spoils the visuals/ Doesn't look very good/Its being Viking (**)/ Dragon head and horn (**)/Only its dragon is so bad (**)/Possible to be scary for other children (**)	7	28%
2	Size	Its size/Too big/ Difficult to carry-storage	5	20%
3	Perception of Robustness (*)	Not strong/Joined with tape/The wheel on the back is made of CD, black tape is used, many screws are used/Its image is made of paper/It is warped-curved	5	20%
4	Color	Its color/s	4	16%
5	Reliability	I don't know how it will move on the wave/Necessity of using the toy under someone's supervision	2	8%
6	General Design	Needs some more development	1	4%
7	Style of Use	Riding of the toy	1	4%
8	High Price Concerns	The state of being an expensive toy	1	4%
9	Material Selection (**)	Being made of plastics totally	1	4%
10	Personal Use (**)	Not suitable for use by more than one person	1	4%
11	Invalid Answer	Big, comfortable, long, fun, I can ride with my friends	1	4%

(cont. on next page)

Table 9 (cont.)

12	Missing Answer	--- /None/No favorite-dislike features	4	16%
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(*) The answers that do not comply with the toy characteristics given in the presentation part of the survey

(**) Inconsistent answers of participants that contradict their other answers

Although it was stated in the presentation section that the toy is for one person in terms of safety, 3 participants stated that “using the toy with their friends” is a feature they like. Again, although no information was given about the detachability of the toy, 1 participant liked that the toy was “detachable”. From the answers given to the question about the “5 most disliked features of the toy”, it is seen that 5 participants did not like the toy (actually the introductory model) in terms of the “robustness/durability” criterion. Although 1 participant did not like our toy suggestion “because it is made entirely of plastic material”, this answer contradicts the answer given by the same participant to the next question. Similarly, in the “Visual Design/Concept” and “Personal Use” categories, it is observed that some participants have contradictory answers with the answers they gave to other questions. The 33rd answer of one of the participants was deemed invalid as the participant gave the same answer to the 32nd question.

In question 34, the participants were asked whether the toy had any features that needed to be changed or added. A total of 9 participants, 5 girls and 4 boys, gave answers to this question as “yes”, “it should”, “of course”, “maybe” without any explanation. On the other hand, 5 boys gave answers such as “no”, “not necessary”, “I don’t think it is necessary” to this question. All answers to this question are shown in Table 10.

Table 10. Answers of the ChiS's 34th question
 "Do you think it is necessary to add other features to this Viking ship or change some of its features?"

No	Participants (Gender, Age)	Non- Explanatory Answers	Explanatory Answers	Definitive Answers
1	Girl, 6	"Yes"	---	---
2	Boy, 10	---	---	"No"
3	Girl, 8	---	"It should be easy to steer, it should be more colorful, it should have a klaxon"	---
4	Boy, 9	---	---	"No"
5	Boy, 9	"Necessary"	---	---
6	Girl, 7	---	"Can I stand up in it? Can I see under the water?"	---
7	Girl, 5	"Maybe"	---	---
8	Boy, 10	---	"Its visuals can be plastic and durable, can be seat belt, engine, emergency exit door and sonar"	---
9	Girl, 10	"Yes"	---	---
10	Girl, 10	"Yes"	---	---
11	Boy, 11	---	---	"Not necessary"
12	Girl, 10	"Necessary"	---	---
13	Boy, 10	"Yes"	---	---
14	Boy, 13	---	"Must be made of rigid plastic" (Inconsistent answer with his 33rd answer)	---
15	Boy, 10	"Necessary"	---	---
16	Boy, 10	"Of course"	---	---
17	Girl, 10	---	"Its color"	---
18	Boy, 5	---	"Its color should be yellow"	---
19	Boy, 5	---	"It may be developed as two people"	---
20	Boy, 13	---	---	"I don't think it is necessary"
21	Boy, 5	---	"A foot pedal may be used instead of the hand pedal"	---
22	Boy, 5	---	---	"No"
23	Girl, 5	---	"Its color and size"	---
24	Boy, 10	---	"It may have a klaxon"	---
25	Boy, 5	---	"We may add front wheels. We want the head to be like a lion"	---
TOTAL: 25 children		9 children (36%)	11 children (44%)	5 children (20%)

The last question (the 35th question), as can be seen in the Parent Survey, is a validation question aimed at verifying that the participants have consciously answered the survey questions. In this question, in which a special directive was required to be followed in line with the aforementioned purpose, 11 of 25 children completed the survey by ticking the option that did not comply with the directive.

5.2.2. Findings of the Online Parent Survey

The parent survey, like the child survey, begins with demographic questions. As mentioned before, parents can often play a direct determining or guiding role in matters such as product preference and purchase for their children (see: Çiçek, 2011). Therefore, in terms of the diversity of socio-cultural and socio-economic data on parents, it was necessary to prepare the demographic section a little more comprehensively.

20 female and 6 male participants participated in the online survey from 9 different cities whose names were also mentioned in the children's survey. Accordingly, Izmir comes first with 11 participants. This is followed by Istanbul with 4 participants, Yalova with 3 participants, Adana and Konya with 2 participants each, and four other provinces with one participant each. While 1 female participant participated in the survey as a "relative", all other participants were parents. The distribution of age ranges according to the gender of the 26 people participating in the study is shown in Table 11.

Table 11. Age ranges of the participants in the parent survey (ParS) by gender

Age Range	Female	Per.	Male	Per.
20-30 years	3	11,53%	---	---
31-40 years	10	38,46%	5	19,23%
41-50 years	6	23,07%	1	3,84%
51 years and above	1	3,84%	---	---
TOTAL	20 women	76,92%	6 men	23,07%

70% of the female participants (14 people) stated that they were graduated from higher education. This is followed by secondary school graduate women with 20% (4 people). While 1 woman answered "higher education dropout", 1 woman did not answer this question. All of the male participants stated that they were graduates of higher education. 7 participants stated that they were educators (teachers and academicians), 5 participants were architects/engineers, and 5 participants were housewives. The other 9 participants work in various occupational groups. All of the male participants stated that they work in a full-time job. In women, this number is 9. 4 women stated that they were working part-time, and 7 women were not working. 24 participants stated their monthly incomes as 3000 TL and above. The monthly incomes

of 2 participants are 2000-3000 TL. However, in this question, which can give an idea about the purchasing power of families, it must be admitted that we overlooked the current market conditions in determining the income ranges. Therefore, no meaningful and/or distinctive data could be obtained from this question.

After the demographic questions, the main part of the survey called the “Parent Question Set” is passed. The first 5 questions, in which the options are given on a 5-point Likert scale, aim to learn some of the observations of the parents about their children’s social and physical development and meanwhile, their children’s interest in aquatic environments. Accordingly, in the first question, 14 participants rate their children’s spontaneous and willing participation in physical and social activities such as plays, trips, and competitions as “5: always”, which is the highest ranking degree. This is followed by the 4th degree with 9 participants, the 3rd degree with 2 participants, and the 2nd degree with 1 participant. No one ticked the lowest ranking rating “1: hardly ever”. In the second question, parents are asked to rate the positive effects of social and physical activities on their children’s individual development. In this question, 20 participants answered “5: At the highest level”. This is followed by the answers of “4: At the high level” with 5 people and “3: At the intermediate level” with 1 person. There is no participant who ticked “2: At a low level” and “1: At the lowest level”. The third question was asked to find out how their children’s readiness levels were according to the parents. Here, parents were asked to rate their children’s interest and competency in using rideable toys appropriate for their age. While 14 participants gave the answer “5: At the highest level”, 8 participants gave the answer “4: At a good level”. 3 participants rated it as “3: At the intermediate level”. 1 person ticked the option “2: A bit”. No one selected the option “1: No interest/competence”. In the 4th and 5th questions, the participants were asked about their children’s interest in aquatic environments and their positive/negative experiences about water. Accordingly, 18 participants stated that their children like being in the water very much (5: S/he loves to go into the water a lot). This is followed by parents who stated that their children like to be in the water at the 4th level with 6 participants and at the 3rd level with 2 participants. There was no participant who ticked the 2nd and 1st levels (1: S/he never likes to go into the water). Similarly, 17 participants stated that their children’s experiences with water were at level 5, that is, totally positive (good/cheerful/safe etc). This is followed by positive experiences at the 4th level with 4 participants and at the 3rd level with 3 participants. The remaining 2 participants did not answer this question.

The 6th-9th questions have been prepared to learn the general opinions of the parents about the rideable aquatic toys. In the 6th question, 7 out of 26 participants said that their children have never had a rideable aquatic toy. In the 7th question, 22 participants stated that they made a decision together with their children when shopping for their children's aquatic toys. 4 participants stated that as buyers and parents, they would only choose toys themselves. None of the participants ticked the option "we leave the choice only to our child". 3 of the 4 participants who made the choice of toys themselves stated their education status as "higher education graduate" and 1 as "higher education dropout". Considering their educational status and the ages of their children, it comes to mind that 3 of these 4 participants do not leave the choice of toys to their children because they are not old enough to make their own decisions (5 years old group). On the other hand, Yazıcı and Aktin (2018) quote that the average age of first purchase in childhood is 8 years old according to researches, however, depending on the welfare level of the society and the family structure of the child, the age for independent shopping may decline to 4 years (Deborah ve Anderson, 2000 cited in Yazıcı and Aktin, 2018:408). A female participant, describing her profession as a "teacher", stated that although her child is 9 years old, the decision to choose and buy toys was made by herself as a parent and buyer. In this case, also considering participation of the low-educated parents who stated that they choose toys with their children, it is understood that the individual toy selection and/or purchasing behaviors of these four parents are not directly related to be high-educated.

In the 8th question, which was prepared as multiple choice, the first 5 criteria that parents would consider when purchasing any rideable aquatic toys were asked. The frequency of selection of 16 criteria, 1 of which is open-ended, is shown in Table 12. In this question, the 5 most important criteria of the participants for buying aquatic toys are listed as "safety" (24 people), "strength/durability" (17 people), "ease of carrying/storage" (14 people), "entertainment" (13 people) and "affordable price" (12 people). This is followed by the toy being beneficial/developer (11 people), the toy being made of "health-friendly materials" (10 people) and others. The prominent criteria in the answers show almost similarities with the data obtained from the studies of Adak Özdemir-Ramazan (2012) and Sakar-Karaduman (2018) in terms of their content and degree of importance for the parents. According to Adak Özdemir and Ramazan's study, the prior criteria of a participant group consisting of mothers in choosing toys is that the toys should be "healthy-safe", "durable-solid" and

“educational-instructive”. These are followed by criteria such as “the toys being suitable for the age and interests of the child”, “being cheap”, “helping the development”, and “being suitable for the child’s gender” (Adak Özdemir and Ramazan, 2012:9,10). On the other hand, in the study of Sakar and Karaduman (2018), the criteria determining the choice of toys by parents are gathered under 4 general headings. These general headings are listed in order of their importance degrees as “quality”, “education”, “health” and “entertainment”. According to the data of the study, the main heading of “quality” includes the sub-headings of “brand-price-product origin”. “Whether the toy is made of plastic”, “whether it has a CE certificate”, “conformity to international standards”, “origin”, “whether it is plush” and “whether it contains small parts” are the sub-headings examined under the main heading of “health”. In the main title of “education”, the most important toy preference criteria of the participating mothers, respectively, are shaped as “supporting development”, “improving tactile intelligence” and “helping foreign language teaching”. According to this, as the other selection criteria of the “education” main title, toys should help children gain gender roles, support their auditory-visual intelligence development and geometric shape education. At the end of the preference lists of the participants in this study, there is the main title of “entertainment”, which consists of sub-headings such as “the toy being entertaining”, “user’s request about the toy” and “shape of the toy” (Sakar and Karaduman, 2017:19,20). The most prominent difference between these studies and ours is that these studies examine general toy selection criteria that cover all toy types, not a specific toy group as in our study.

Table 12. Answers of the ParS’s 8th question
 “If you were to buy rideable aquatic toys, what would your top 5 criteria be?”

No	Criteria	Freq.	Per.
1	Its being safe/reliable	24 (19 women / 5 men)	92,30%
2	Its being robust/durable	17 (12 women / 5 men)	65,38%
3	Ease of carriage/storage	14 (12 women / 2 men)	53,84%
4	Its being entertaining	13 (10 women / 3 men)	50,00%
5	Affordable price	12 (10 women / 2 men)	46,15%
6	Its being beneficial/developer	11 (9 women / 2 men)	42,30%
7	Its being made of materials suitable for health	10 (9 women / 1 man)	38,46%
8	Its being made of quality materials	7 women	26,92%
9	Its being useful	6 (4 women / 2 men)	23,07%
10	Ease of use/intelligibility of use	6 (3 women / 3 men)	23,07%

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Table 12 (cont.)

11	Innovative design	3 (2 women / 1 man)	11,53%
12	Its being comfortable	2 (1 woman / 1 man)	7,69%
13	Modularity	2 (1 woman / 1 man)	7,69%
14	Its being mountable	2 (1 woman / 1 man)	7,69%
15	Multipurpose use	1 woman	3,84%
16	Other: ...	---	---

In the 9th question, the parents were asked what the top 5 criteria would be for their children's preferences of the rideable aquatic toys, this time. According to the answers of the parents, the first 4 criteria that prominent in the selection of aquatic toys for their children are that the toy is being "entertaining" (24), "reliable" (20), "beautiful/attractive/cute" (16) and "robust/durable" (13). This is followed by the toy being "colorful" (11 people) and "comfortable" (11 people). The frequency of selection of 14 criteria, 1 of which is open-ended, is shown in Table 13.

Table 13. Answers of the ParS's 9th question
 "What do you think are the 5 most important criteria for your child about rideable aquatic toys?"

No	Criteria	Freq.	Per.
1	Its being entertaining	24 (19 women / 5 men)	92,30%
2	Its being safe/reliable	20 (16 women / 4 men)	76,92%
3	Its being attractive/beautiful /lovely	16 (14 women / 2 men)	61,53%
4	Its being robust/durable	13 (10 women / 3 men)	50,00%
5	Its being comfortable	11 (8 women / 3 men)	42,30%
6	Its being colorful	11 (8 women / 3 men)	42,30%
7	Ease of use	9 (7 women / 2 men)	34,61%
8	Its being adventurous	8 (5 women / 3 men)	30,76%
9	Ease of carriage	6 (5 women / 1 man)	23,07%
10	Its being fast	6 (3 women / 3 men)	23,07%
11	Multipurpose use	4 (3 women / 1 man)	15,38%
12	Its being for one person	1 woman	3,84%
13	Its being inflatable	1 woman	3,84%
14	Other: ...	---	---

The 10th-14th questions are about inflatable aquatic toys. In the 10th question, the participants were asked to rate the statement "All the rideable aquatic toys we have bought so far are inflatable toys" with a 5-point Likert scale (5: I totally agree, 1: I totally disagree). 17 participants stated that they completely agree with this statement. While 5 people agree with this statement at the 4 level, 2 people agree at the 3 level. One person each stated that they did not agree with this statement by choosing the 2nd

and 1st levels. Similarly, in the 11th question, the participants were asked to what extent they agreed with the statement “As a parent, I am satisfied with my child’s experience of using inflatable aquatic toys”. 12 people completely agree with this statement. While 10 people agree with this statement at the 4th level, 4 people agree at the 3rd level. There is no one who says that they do not agree with this statement by choosing the 2nd and 1st levels. In the 12th question, 14 participants said that they buy inflatable aquatic toys for their children “as they become unusable or lost”. “Whenever our child wants it” and “We do not prefer to buy inflatable aquatic toys” options are not selected. In the 13th question, the participants were asked the top 5 reasons for buying inflatable aquatic toys. The frequencies of the answers to the 13th question are shown in Table 14. In the 14th question, the participants were asked whether they found the material from which the inflatable aquatic toys were made to be healthy. While 18 participants answered “I am undecided/I don’t know”, 4 participants answered “Yes” and 4 participants answered “No”.

Table 14. Answers of the ParS’s 13th question
 “What are your top 5 reasons to buy inflatable aquatic toys?”

No	Reasons	Freq.	Per.
1	The previous one has become unusable and/or lost	23 (18 women, 5 men)	88,45%
2	Easy to use and store	22 (18 women, 4 men)	84,61%
3	More safer	21 (15 women, 6 men)	80,76%
4	More lighter	17 (15 women, 2 men)	65,38%
5	Our child likes this kind of aquatic toy the most	16 (11 women, 5 men)	61,53%
6	More affordable	14 (10 women, 4 men)	53,84%
7	We don’t know any other types of aquatic toys	9 (6 women, 3 men)	34,61%
8	There are more varieties	8 (7 women, 1 man)	30,76%
9	Other: ...	---	---

Questions 15th-17th were prepared to learn the knowledge level of the participants about pool noodles. Accordingly, in the 15th question, 20 participants stated that they used and/or bought pool noodles before. While 4 participants said that they only saw pool noodles, 2 people said that they had never seen pool noodles before/didn’t know what it was. In the 16th question, the participants were asked for what purposes the pool noodles could be used. The frequency of the answer “as an aid to swimming” is 21 participants. This is followed by the answers “for fun in the water”

with 15 people and “as sports equipment” with 5 people. One participant used pool noodles as insulation material in simple repairs. In the 17th multiple-choice question, the participants were asked how they would characterize the pool noodles verbally. The frequencies of the answers are given in Table 15.

Table 15. Answers of the ParS’s 17th question
 “Which of the following would you say about pool noodles?”

No	Options	Freq.	Per.
1	Practical	18 (13 women, 5 men)	69,22%
2	Useful	14 (10 women, 4 men)	53,84%
3	Affordable	14 (11 women, 3 men)	53,84%
4	Multipurpose	9 (7 women, 2 men)	34,61%
5	Durable	7 (4 women, 3 men)	26,92%
6	Safe	6 (3 women, 3 men)	23,07%
7	I’ve no idea	2 women	7,69%
8	Other: ...	---	---

Questions 18th-20th were asked to find out the participants’ foresights about the use of pool noodles as a material for making a rideable aquatic toy. The 18th and 19th questions are the same in format. However, the participants were asked whether it is possible to produce a rideable aquatic toy from pool noodles in terms of “usefulness” in first one and “safety” in the other, just as a foresight. In both questions, the same 12 participants answered “Yes”, the same 12 participants answered “I am undecided/I don’t know”, and the same 1 participant answered “No”. An inconsistency was detected in the answers given by one of the participants to both questions: Accordingly, the participant answered “Yes” for the “usefulness” criterion in the 18th question, and she answered “I am undecided/I don’t know” for the “safety” criterion in the 19th question. In the 20th question, the participants were asked what the 5 most important features of a possible rideable aquatic toy to be made from pool noodles should be. The frequencies of the answers given are shown in Table 16. It was detected that the only participant who gave an open-ended answer to this question was a female interior architect. The open-ended comment of this participant, who has a design based profession, includes a suggestion to increase the contact of the toy with water by using extra pool noodles to make our toy proposal more balanced. As a design problem that we also envisaged, it is understood that this suggestion of the participant was inspired by the short introduction video we presented in the survey.

Table 16. Answers of the ParS's 20th question
 "If a rideable aquatic toy is to be made from pool noodles, what do you think should be the 5 most important features?"

No	Features	Freq.	Per.
1	Robustness/durability	25 (19 women, 6 men)	96,15%
2	Ease of carriage and storage	20 (15 women, 5 men)	76,92%
3	Physical safety	18 (15 women, 3 men)	69,22%
4	Ease of installation and use	16 (12 women, 4 men)	61,53%
5	Health safety	11 women	42,30%
6	Educational-entertaining-developing benefits	10 (8 women, 2 men)	38,46%
7	Attractive visual design	8 (5 women, 3 men)	30,76%
8	Demountability (modular structure)	8 (5 women, 3 men)	30,76%
9	Multipurpose use	6 (5 women, 1 man)	23,07%
10	Reasonable price	4 (3 women, 1 man)	15,38%
11	Innovative/original design	4 (2 women, 2 men)	15,38%
12	Other: "Pool noodles make me feel like they are harder to float than inflatable products. Let's say 1 prototype is made like this, my idea would be none of the 3 products in the images. In its current form, the toy will oscillate a lot when above the water." (OpEn)	1 woman	3,84%

Finally, the 21st-25th questions are directly related to our toy proposal. Accordingly, in the 21st question, 15 participants stated that they could buy our rideable aquatic toy proposal shown in the introductory images for their children. 7 participants said that they would not buy our toy proposal for their children. 4 people are undecided about this. 4 of the 15 participants who answered "Yes" to this question are the participants who stated that they were undecided in the 18th and 19th questions. This part of the data for the 21st question suggests that the embodiment of the design idea through introductory video and 3D visuals and photos was effective in the transition of these 5 participants from being undecided about aquatic toys made from pool noodles to purchasing our toy proposal. Again, 5 of the 7 participants who answered "No" in this question are those who stated that they were undecided in the 18th and 19th questions. One of these 7 participants, a female interior designer, answered "No" to both questions consistently. It comes to mind that the reason for this is related to the participant's open-ended answer to the 20th question: In her answer to this question, the participant thinks that pool noodles are less buoyant than inflatable toys. Another participant also stated that she would not buy our toy suggestion in the 21st question, although she answered "Yes" to the 18th and 19th questions. Similarly, 3 of the 4 participants who were undecided in the 18th and 19th questions stated that they were also undecided about

buying the toy. Another participant, who had previously answered “Yes” to the 18th and 19th questions, gave the answer “I am undecided” in this question.

In the 22nd and 23rd questions, the participants were asked open-ended about the first 5 criteria that would cause them to buy or not buy our toy proposal. The frequencies of the answers are shown in Table 17 and Table 18.

Table 17. Answers of the ParS’s 22nd question
 “What are the top 5 criteria that will make you buy this toy?”

No	Criteria	Freq.	Per.
1	Entertainment: to be entertaining	15 (11 women, 4 men)	57,69%
2	Safety/Reliability: to be safe/reliable	13 (10 women, 3 men)	50,00%
3	Portability/Storability: to be portable/ storable/light	9 (5 women, 4 men)	34,61%
4	Price: its price/to be affordable/to be cheap	7 women	26,92%
5	Visual Design/Concept: its visual design/its appearance/ to be beautiful/beautiful design/cute/its design/its shape/to be boat shaped	7 (5 women, 2 men)	26,92%
6	Colorfulness: to be colorful	7 (6 women, 1 man)	26,92%
7	Usability/Ergonomics: being handy/ ergonomic	6 (3 women, 3 men)	23,07%
8	Robustness/Durability: to be robust/durable	5 women	19,23%
9	Health: to be healthy	5 (4 women, 1 man)	19,23%
10	Practicality: to be practical	3 (1 woman, 2 men)	11,53%
11	Educational/Teaching: being educational/ instructive	3 (1 woman, 2 men)	11,53%
12	Technical features/Equipment: it has pedals	3 (2 women, 1 man)	11,53%
13	Creative design: to be surprising/creative/ interesting	3 women	11,53%
14	Balance: to be balanced	2 women	7,69%
15	Cultural connotation	1 woman	3,84%
16	Suitability for age and development	1 woman	3,84%
17	Usage: to be for the use of a person	1 woman	3,84%
18	Admiration: if my child likes it	1 woman	3,84%
19	Demountability *	1 woman	3,84%
20	Multi-user use *	1 man	3,84%
21	I don't buy	3 (2 woman, 1 man)	11,53%

*: The participants were not told that the toy had such a feature.

Table 18. Answers of the ParS's 23rd question
 "What are the top 5 criteria that will prevent you from buying this toy?"

No	Criteria	Freq.	Per.
1	Size: hard to store/difficult to carry/size/ takes up a lot of space/too big/being too large for the child to use	14 (12 women, 2 men)	53,84%
2	Safety/Reliability: being unsafe	9 (8 women, 1 man)	34,61%
3	High Price Concerns: being expensive/not being cheap	7 (5 women, 2 men)	26,92%
4	Robustness/Durability: not being durable/not being robust	6 (5 women, 1 man)	23,07%
5	To find unnecessary: unnecessary/I don't find necessary/trash	3 (2 women, 1 man)	11,53%
6	Health: being unhealthy	2 (1 woman, 1 man)	7,69%
7	Visual Design/Concept: its appearance/design is not beautiful	2 women	7,69%
8	Desire level: I won't buy it if my child doesn't want it	1 woman	3,84%
9	Installation: difficult to install	1 man	3,84%
10	Technical features/Equipment: it has not foot pedals	1 woman	3,84%
11	Entertainment: not to be entertaining	1 woman	3,84%
12	Usage 1: to be for the use of a person	1 woman	3,84%
13	Usage 2: difficult to use	1 woman	3,84%
14	Quality: poor quality	1 woman	3,84%
15	Color	1 man	3,84%
16	Pedagogical 1: requires supervision	1 woman	3,84%
17	Pedagogical 2: not suitable for my child's age and development	1 woman	3,84%
18	There is nothing negative about it/I have no negative thoughts/I don't know/ ---	4 (3 women, 1 man)	15,38%

In the 24th question, the participants were asked to estimate their children's level of liking and/or wanting our toy proposal on a 5-point Likert scale. The frequencies of the answers are shown in Table 19. In this question, a female participant, who stated that her child would definitely not like and/or not want our toy proposal, consistently stated that she did not like our toy proposal in terms of design, use and safety features in other questions about it ("Not safe, difficult to store and use, large in size, single-person, not well-designed"). From this point of view, it is understood that the participant stated her personal preference rather than estimating the level of appreciation of her child. On the other hand, it is also possible for this participant, who has a 14-year-old daughter, to give this answer, considering that her child will not be interested in our toy proposal due to her age. The same participant stated in one of her previous answers that she usually chooses her daughter's rideable aquatic toys together with her. When these two responses of the participant are evaluated together, it can be said that the general view that children's abilities, interests and tastes change with their

development, and hence age, is exemplified as a data also frequently encountered in the literature (see also: Zhang and Peng, 2010:1179-1181; İşmen Gazioğlu and Kılıçaslan Çelikkol, 2012). Some data from the children’s survey and, as will be seen later, the expert survey also seem to support this argument: 10 girls and boys between the ages of 8-13 preferred our toy proposal at the “3 level” the most and at the “None level” the least. One of the expert participants thinks that children over the age of 8 will not find our toy proposal interesting.

Table 19. Answers of the ParS’s 24th question
 “What do you think the degree to which your child likes and/or wants this toy?”

5 S/he will definitely love/want	4 S/he will like/want	3 S/he will neither like/want nor dislike/want	2 S/he will not like/want	1 S/he definitely will not like/want
10 participants (38,46%)	9 participants (34,614%)	6 participants (23,076%)	---	1 participant (3,846%)
TOTAL: 26 participants				

In the 25th question, parents were asked to estimate the price range of our toy proposal based on the given options. In this question, 6 participants marked the range of 1-100 TL, 10 participants marked the range of 100-200 TL, 7 participants marked the range of 200-300 TL, 2 participants marked the range of 300-400 TL, and 1 participant marked 500 TL and above. No one marked the 400-500 TL range.

The 26th and final question, as in the Child Survey, is the willful/directive validation question, in which it is checked that the participants understood and answered the survey questions. It is observed that only 15 of the 26 participants answered this question in accordance with the directive.

5.2.3. Findings of the Online Expert Survey

The online expert survey was conducted with the participation of 6 female participants (App. D). The survey consists of 13 open-ended questions. In the first question, the participants were asked to briefly introduce themselves and their areas of expertise. Two of the participants are graduates of psychology. One of these participants

works as a manager and psychologist in the field of “pre-school education”, and the other as a specialist psychologist with a master’s degree in the field of “special education”. The other two participants stated that they graduated from the field of “pre-school education” and they teach in the same field. One of the last two participants is an online education consultant who has a master’s degree in “educational programs” and the other is an assistant director who has a master’s degree in “educational management” and works at the M.E.B. The average age of the participants is 39.

The answers to the initial questions generally summarize the views on child-play-toy interaction in the pedagogical literature. In the 2nd question, the participants were asked what the play and toy meant to them when viewed from an expert’s point of view. It is often repeated in the answers that the play provides an important learning and self-expression environment for children. In addition, one of the participants stated that the play is an educational and entertaining activity not only for children but also for people of all ages. According to the participants, plays play a developing and supporting role by giving them various abilities in all developmental areas of children in general. All participants describe toys as tools used in plays. One of the participants also included the play materials in this scope.

In the 3rd question, the participants were asked to explain their answers by asking whether there was a technical and practical distinction between the concepts of “toy” and “play material/play tool”. 4 participants think that there is no need for any distinction on this issue. So much so that, according to one of them, it does not seem possible to evaluate them separately, since the concepts of toys and play materials are largely intertwined. Another participant stated that since toys and play materials are used for the same purpose in the play, there is no need to make any distinction between them. While one of the other two participants stated that she was undecided on this issue, she expressed her own opinion on what a toy means technically and practically. According to this participant, the features of toys such as material, shape and size express the “technical” aspect of toys. What the toys expresses to the participant in the “practical” sense is that the toys should be sufficient, useful, understandable, suitable for the determined age group, suitable for the purpose of use and skill acquisition. The last participant stated that she did not find the question explanatory in terms of “evaluating technically and practically” and was content with stating that toys and/or play materials differ according to age and gender.

In the 4th question, the participants were asked whether aquatic environments have any contribution to child development, and if so, in which developmental area and in what way. All participants agree that aquatic environments contribute positively to child development. In the participant answers, it was stated that these positive contributions were observed in the physical, sensory, emotional, social and psychological development areas of children.

In the 5th question, it is aimed to learn the perceptions of the participants of “aquatic toys that can be ridden and have a carrying function”. For this purpose, the participants were asked which of the rideable aquatic toys that came to their minds first and what alternative toy types could be. In the answers of the 4 participants, inflatable products such as sea-bed, inflatable boat, inflatable armband, sea-ring, as well as pool noodles (which users describe as “sausage”), canoe and pedalo came to the fore. One of the participants added also beach toys such as buckets and shovels for playing in the sand, parasailing equipment and bananas used in extreme sports to these product groups, possibly because she misunderstood the question. Again, possibly as a result of this misunderstanding, the participant’s alternative toy suggestion was plastic and/or rubber-based books that can be read in water. Another participant confused the expression “ridable aquatic toys with a transport function” with buckets and shovel sets used to transport materials such as water and sand. One of the participants did not express an opinion on this question, saying that she had no idea. The general conclusion reached from the data of this question is that although they are experts in the field of pedagogy, the participants have the same knowledge degree as the rest of the society in terms of perception of rideable aquatic toys. Several product groups that are not accepted as toys by the technical regulations encountered in the literature on aquatic toys were evaluated as aquatic toys even by our expert participants.

In the 6th question, this time, experts were asked whether rideable aquatic toys have any pedagogical benefits for child development. In the second part of the question, it was asked what competencies child users should have in order to use such toys. In the answers, the pedagogical benefits provided by rideable aquatic toys mostly stand out as psychomotor development (gaining balance and coordination skills), emotional and psychological development (gaining the sense of achievement and self-confidence), cognitive development (gaining problem solving ability), and psycho-social development (gaining the awareness of cooperation and teamwork) areas. One of the participants stated that the competencies required for children to be able to use rideable

toys are children's ability to balance on the toy, swim and stay on the water. Another participant, stating that rideable aquatic toys will contribute to the psychomotor development and self-confidence of children, thinks that children do not need any special competence when using these types of toys. According to this participant, it is only important that such toys are introduced to children and that children love to use them. The participant, who counted parasailing equipment among the rideable toys in the previous question, gave the same equipment as an example in this question and stated that these type of products could be suitable for users over the age of 12. The last participant, on the other hand, mentioned that age and gender factors are important rather than the necessity of any competence in the use of aquatic toys, as in all toy groups.

In the 7th question, the participants were asked whether they had any knowledge and/or experience of using pool noodles in their personal and/or professional lives. In the second part of the question, it was asked in what other areas pool noodles could be used. The participant, who is a kindergarten administrator and psychologist, stated that her students use pool noodles in their swimming lessons. According to the participant's observation in this experience, children gain self-confidence thanks to pool noodles while learning to swim. The same participant added that they use pool noodles as a material to support creativity in making toy horses during the activity hours and as a safety precaution against possible impacts and injuries at the kindergarten doors. Another kindergarten teacher stated that swimming with pool noodles is a very enjoyable experience. Again, this participant, while exemplifying the alternative use of pool noodles, she said that her students used them as handmade toy materials during art and activity hours. The other 4 participants stated that they had no knowledge and/or experience of using pool noodles.

Starting from the 8th question, the questions in which our toy proposal was evaluated by the participants were passed. Just before this, as in other surveys, our toy proposal was introduced using verbal explanations and visuals.

In the 8th question, the participants were asked to explain which age group this toy is suitable for in terms of child development categories, along with their reasons. The participant, who is a kindergarten manager and psychologist, thinks that our toy proposal would be suitable for the 5-14 age group. The participant attributes this to the fact that children in this age group have more advanced physical control, hand-foot coordination, problem solving and swimming skills. The participant, who is the online

education coordinator, is of the opinion that our toy proposal is suitable for the primary school age range without any explanation. “İlköğretim ve Eğitim Kanunu” in Türkiye defines the mentioned age range as 6-14 years old (Resmi Gazete, 1961). The first of the two kindergarten teachers stated that our toy proposal would be suitable for children aged 3-8 if necessary precautions were taken. Accordingly, it is predicted that children under the age of 3 will be cognitively and physically inadequate to use our toy proposal, while children over the age of 8 will most likely not find the toy interesting. The other kindergarten teacher participant, on the other hand, stated that our toy proposal would be suitable for users between the ages of 12-16, without any other explanation. The deputy school principal participant thinks that our toy proposal is a suitable product for the 7-11 age group for safety reasons. According to the last participant, a special education psychologist, the appropriate age range for our toy proposal should be 3-5. According to the participant, approximately 3 years old is known as the age of cycling in terms of motor coordination competence. Since our toy proposal also has a pedal mechanism, as in a bicycle, the participant thinks that this age group can use it. The participant added that if the toy is moved with paddles instead of pedal mechanism, children’s right and left brain lobes will work together and their “cross coordination” skills will improve. Again, according to her, the age range of the user can be expanded to 4-6 years in case of using the paddles.

In the 9th question, the participants were asked to evaluate the potential of our toy proposal to contribute to development pedagogically. The first participant thinks that the toy can attract children’s attention thanks to its appearance, and that the idea of being on the water is always attractive to children. The participant states that our toy proposal can contribute to their pedagogical development by increasing the children’s desire for play, as it provides fun and opportunity to explore. According to one of the kindergarten teacher participants, since our toy proposal is a structured toy, it will not contribute much to the pedagogical development of children. The other kindergarten teacher participant thinks that our toy proposal can contribute to psychomotor development, assuming that it will improve the skills of gross motor skills and balance. The other kindergarten teacher participant thinks that our toy proposal can contribute to psychomotor development, assuming that it will improve gross motor skills and balance skills. In addition, it is foreseen that if used in group plays, our toy proposal will contribute to psychosocial and emotional development by raising awareness of cooperation. Another participant sufficed with saying that our toy proposal can be used

for entertainment purposes. The last participant, who is a specialist psychologist, made a generalization over all types of toys and implied that our toy proposal could contribute to children's social, motor and cognitive development categories. One of the participants stated that she had no knowledge on this subject.

In the 10th question, the participants were asked to describe our toy proposal using only words. The purpose of this question was to find out which features of our toy proposal were considered more noteworthy by educators, without guiding their opinions. The answers given to this question were "adventure, exploration, distant horizons", "colorful, practical, small age group, single person", "noodle ship, ship, dragon", "sea boat", and "interesting". One participant did not answer the remaining questions, starting with this question.

In the 11th question, the participants were asked what they liked or disliked about our toy proposal or what they thought was overlooked. The first participant evaluated the Viking themed character design of the toy as an element that could attract the attention of children. Also, in terms of using the toy under adult supervision, she suggested adding plastic handles and pull straps to the toy to facilitate adult control. The second participant, similar to the first, thinks that our toy proposal has a design that can attract the attention of children. However, it is understood that the necessity of using the toy under adult supervision causes a kind of insecurity in this participant. The third participant, a kindergarten teacher, stated that she did not find the toy durable and did not like the operating mechanism of the toy. The fourth participant, the deputy school principal, thinks that it would be better to use a foot pedal instead of the hand pedal. The last participant, who is a special education psychologist, focuses more on concept design and suggests the use of other conceptual patterns such as the Venetian gondola, the Bandırma Steamship, or the use of different animal themes. In addition to these, the participant recommends that our toy proposal be used for the 3-5 age group, accompanied by informative stories.

In the 12th question, the participants were asked their opinions about the character design of our toy proposal. Then, they were asked to evaluate the use of elements such as cartoon characters in the visual design of products for children. According to the participant, who is a kindergarten manager and psychologist, the Viking concept of the character design of the toy offers pleasant connotations in terms of supporting children's feelings of exploration and adventure. The participant stated that she found it positive to use cartoon characters to make children prefer any toy as

long as they are used for pedagogically correct purposes. The 3rd participant, one of the kindergarten teachers, stated that she liked the character design of the toy, but she could still prefer a more genderless design. The 4th participant, who is the deputy school principal, evaluated the use of cartoon characters in the visual design of children's products as an effective way of attracting attention and marketing. This answer of the participant also summarizes the views frequently encountered in the related literature. Two participants did not answer this question. The last participant, on the other hand, did not answer this question separately, since she already emphasized character design in her previous answer.

In the 13th question, the participants were asked if there were any topics that they wanted to add or that they thought were overlooked. In this question, the expert survey was terminated without any comments and/or additions by the participants.

5.2.4. An Overview of the Findings

In this section, it has been tried to make a summary evaluation with the help of the findings obtained from the general of our study. The findings of our online surveys and one-person physical user trials, as well as various data obtained from the literature, also play a role in answering the research questions determined at the beginning of our study:

- **1st Research Question:** “What are the key success factors of a RAT design?”

In particular, the findings of the questions regarding the determination of preference criteria for RATs in child and parent surveys can be considered as some of the key success factors of RAT design within the scope of our study. The child and parent preference criteria determined in this context have been updated by categorizing the criteria with similar content under the same headings and are summarized in Table 20 comparatively.

Table 20. Comparative top 5 key success factors of RAT design (General)

No	Findings of ChiS (see: Table 5)	Per.*	Findings of ParS (see: Table 12)	Per.*	Findings of ParS (see: Table 13)	Per.*
	14th question: “What are your 5 favorite features of RATs?” (OpEn)		8th question: “If you were to buy RATs, what would your top 5 criteria be?” (MuCh)		9th question: “What do you think are the 5 most important criteria for your child about RATs?” (MuCh)	
1	Functional Properties (Buoyancy): “the toy’s ability to float/move/not sink in water”	48%	Safety/Reliability	92,30%	Entertainment	92,30%
2	Entertainment: “its being fun”	40%	a) Robustness/ Durability b) Material Suitability (for Production/Health)	65,38%	Safety/Reliability	76,92%
3	Colorfulness: “its being colorful”	32%	EoC/S	53,84%	Attractiveness	61,53%
4	a) Safety/Reliability: “its being safe/protective/balanced” b) Comfort: “its being comfortable/relaxing”	24%	Entertainment	50%	Robustness/ Durability	50%
5	Physical Properties (Tactile): “its being soft/puffidic/bloated”	20%	Affordable Price	46,15%	a) Colorfulness b) Comfort	42,30%
6	Speed: “its being fast”	16%	Being Beneficial/ Developer	42,30%	EoU	34,61%
7	a) Attractiveness: “to have a beautiful shape” b) EoC/S: “its being portable/it takes up little space”	12%	Usefulness/ Multipurpose Use	26,92%	Being Adventurous	30,76%
8	Functional Parts: “to have underwater window/sunshade”	8%	EoU/IoU	23,07%	a) EoC b) Speed	23,07%
9	**	**	a) Innovative Design b) Modularity/ Mountability	11,53%	Multipurpose Use	15,38%
10	**	**	Comfort	7,69%	**	**

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Table 20 (cont.)

* Percentages for 25 children	* Percentages for 26 parents
** The answers with a rate below 8% are not included in the table (for ChiS)	** The answers with a rate below 7,69% are not included in the table (for ParS)
Note: Multiple criteria with the same score are rated together in the same order (as a, b, c...).	

Looking at the table, it is seen that the priorities of the child participants in terms of preference criteria differ from those of the parents, as might be expected from their nature.

While the priority criteria of children typically display a user profile, the priority criteria of parents draw more of a buyer profile. Accordingly, it can be said that the priority criteria of children generally focus on meeting their needs such as entertainment, liking, speed passion, and relaxation, which are directly derived from the use of the aquatic toys. The priority criteria of the parents, on the other hand, show that more importance is given to the economic and functional added values of RATs. In addition, it can be said that parents make mostly accurate estimations on the basis of the first 5 preferences, even if the order changes when estimating the priority preferences of the children. Even so, it is observed that even when estimating the possible answers of their children, parents cannot give up on choosing criteria such as “safety & reliability”, “robustness & durability”, “ease of use”, which emphasize their own parenting responsibilities. This situation reminds once again the fact that although toy designs are made for children, who are the end users, the parent criteria also give clues that cannot be ignored for the designers.

Although the buoyancy function of any rideable aquatic toy in the eyes of adults is the natural task that the toy must meet, it is seen that the child participants still gave the highest score to this criterion. Considering that the criterion of fun is in the second place, it comes to mind that the importance of the buoyancy function for children may also be related to the idea of “being on the water is fun”.

It is observed that the majority of these general success factors mentioned above are also valid for our toy proposal designed using PE pool noodles. Accordingly, the answers given to the questions directed to children and parents regarding the preferability of our toy proposal are summarized in Table 21, comparatively.

When the parent data of Table 21 and the answers given to the 20th question of the parent survey (see: Table 16) are compared, it is seen that the order of the parents’

general preference criteria for RATs to be produced from PE pool noodles has changed more or less, when it comes to the preference criteria of our toy proposal. According to Table 16, which shows the multiple-choice answers of 20th question in the parent survey, the overall key success factors in the top 5 list for the design of any RAT made from pool noodles are listed as “robustness/durability”, “ease of carriage and storage”, “physical safety”, “ease of installation and use” and “health safety”. In Table 21, which consists of comparative data, the first 5 positive preference criteria obtained from the parents’ open-ended answers about our toy proposal are listed as “entertainment”, “safety/reliability”, “portability/storability”, “price & visuality & colorfulness” and “usability”. The first 5 negative criteria of the same table in terms of not preferring our toy proposal are determined as “size”, “safety/reliability”, “price”, “robustness/durability” and “to find unnecessary”.

Table 21. Comparative top 5 key success factors of our toy proposal

Findings of ChiS (see: Table 8 & Table 9)		Findings of ParS (see: Table 17 & Table 18)						
No	Positive Criteria	Per.*	Negative Criteria	Per.*	Positive Criteria	Per.*	Negative Criteria	Per.*
	32nd question: “What are the 5 things you like about this toy Viking ship?” (OpEn)				22nd question: “What are the top 5 criteria that will make you buy this toy?” (OpEn)			
	33rd question: “What are the 5 things you dislike about this toy Viking ship?” (OpEn)				23rd question: “What are the top 5 criteria that will prevent you from buying this toy?” (OpEn)			
1	Visual Design/Concept: “Image/Viking symbol/ Prow/Beautiful/Nice shape/ Sweet/Original/Different/ Remarkable/Interesting/ Aesthetics/ Historical”	68%	Visual Design/Concept: “The black band spoils the visuals/ Doesn’t look very good/Its being Viking (***)/Dragon head and horn (***)/Possible dragon is so bad (***)/Possible to be scary for other children (***)”	28%	Entertainment: “Its being entertaining”	57,69%	Size: “Hard to store/difficult to carry/size/takes up a lot of space/ too big/its being too large for the child to use”	53,84%
2	a) Safety/Reliability: “Its being safe/Feeling safe/I can feel safe” b) Technical Features: “I like the propeller/Fin/ Hand pedal/Tail/Seating area” c) Entertainment: “Its being entertaining”	20%	a) Size: “Its size/Too big/ Difficult to carry-storage” b) Robustness/Durability (**): “Not strong/Joined with tape/The wheel on the back is made of CD, black tape is used, many screws are used/Its image is made of paper/It is warped-curved”	20%	Safety/Reliability: “Its being safe/reliable”	50%	Safety/Reliability: “Its being unsafe”	34,61%

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Table 21 (cont.)

3	<p>a) Size: “Its being big/ Long”</p> <p>b) Lightness: “Lightness/ Its being light”</p> <p>c) Function A: “Its floating on water/Its staying on water surface/Its being rideable”</p>	16%	Color: “Its color/s”	16%	Portability/ Storability: “Its being portable/storable/ light”	34,61%	High Price Concerns: “Its being expensive/not being cheap”	26,92%
4	<p>a) Function B “Ergonomics/Working my arms while using/ Advancing when pedaling”</p> <p>b) Color “Its being colorful”</p> <p>c) Multi-user (**) “I can ride with my friends”</p>	12%	Reliability: “I don’t know how it will move on the wave/ Necessity of using the toy under someone’s supervision”	8%	<p>a) Price: “Its price/Its being affordable/Its being cheap”</p> <p>b) Visuality: “Its visual design/its appearance/Its being beautiful/beautiful design/cute/its design/ its shape/Its being boat shaped”</p> <p>c) Colorfulness: “Its being colorful”</p>	26,92%	Robustness/Durability: “Its not being durable/not being robust”	23,07%
5	<p>a) Personal Use: “Its being for single person use”</p> <p>b) Softness: “Its being soft”</p> <p>c) Comfort: “Its being comfortable”</p> <p>d) Sense of Adventure: “Its being adventurous/ Adventurous”</p>	8%	****	****	<p>Usability/ Ergonomics: “Its being handy/ ergonomic”</p>	23,07%	To find unnecessary: “Its being unnecessary/I don’t find necessary/ Its being trash”	11,53%

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Table 21 (cont.)

6	****	****	****	****	<p>a) Robustness/Durability: “Its being robust/durable”</p> <p>b) Health: “Its being healthy”</p>	19,23%	<p>a) Health “Its being unhealthy”</p> <p>b) Visual Design/Concept “Its appearance/design is not beautiful”</p>	7,69%
7	****	****	****	****	<p>a) Practicality: “Its being practical”</p> <p>b) Educational/Teaching: “Its being educational/instructive</p> <p>c) Technical features/Equipment: “It has pedals”</p> <p>d) Creative design: “Its being surprising/creative/ interesting</p>	11,53%	****	****
8	****	****	****	****	Balance: “Its being balanced”	7,69%	****	****

* Percentages for 25 children
 ** The answers that do not comply with the toy characteristics given in the presentation part of the survey
 *** Inconsistent answers of participants that contradict their other answers
 **** The answers with a rate below 8% are not included in the table (for ChiS)

Note: Multiple criteria with the same score are rated together in the same order (as a, b, c...).

- **2nd Research Question:** “Could PE pool noodles be suitable/useful structural components in the design of a physically stable carrier aquatic toy, apart from their habitual usage?”

Especially in the results of the parent survey, it is seen that almost half of the participants are undecided about PE pool noodles being a suitable and/or useful RAT making material (see: Answers of the 18th and 19th questions). When a common evaluation is made with the findings of other related questions, it is understood that such undecided opinions are mostly due to the idea that PE noodles will cause transportation and storage difficulties due to the large space required. However, in the 17th question, 18 participants qualified PE pool noodles as “practical”. In the same question, 14 participants stated that the pool noodles are “useful”, 7 participants stated that they are “durable” and 6 participants stated that they are “reliable”. Moreover, 15 of the 26 participants declared that they would buy our sample toy proposal made of PE pool noodles for their children in the 21st question.

As a result, considering the existence of users who care less or do not care about the portability and storability issues of any RATs made from PE pool noodles, it can be said that pool noodles are still suitable toy making materials, thanks to their several important properties such as material stability & durability, high buoyancy and less risk of chemical release. Our model making studies and physical use experiments carried out within the scope of our study, as well as the examples we encountered during our similar product research, support this view. At this point, it becomes more important to develop designs suitable for disassembly and reassembly in terms of modularity in order to minimize the transportation and storage problems caused by the physical dimensions of such a toy. However, in cases where this is not appropriate in terms of product durability and usage safety, it is possible to classify toys that will be produced from PE noodles as products that are generally sold as integrals, such as battery cars, rocking horses or tricycles.

- **3rd Research Question:** “What are the advantages and disadvantages of aquatic toys made of PE pool noodles against inflatable PVC toys?”

The most important use advantage of PE pool noodles over inflatable PVC materials is due to the stable closed cellular structure of PE foam. Thanks to this material feature, material damages such as puncture, explosion and tearing, which can

be dangerous for inflatable PVC toys when on water, do not occur in use of aquatic toys made of PE foam. In the worst case scenario, even if the physical integrity of an aquatic toy made from PE pool noodles is damaged while the user is on the water, the dispersed noodles will retain their buoyancy. Even in this case, it will still be possible for the user to stay afloat by holding on to them, provided that s/he is of the appropriate age in terms of cognitive and physical abilities. The same usage scenario is much more likely to cause more dangerous consequences, especially in inflatable PVC toys, whose carrier structure consists of a single air compartment and which is relatively mediocre in terms of design, material and production quality.

The biggest possible disadvantage of toys produced from pool noodles against inflatable toys is that, especially for toys that do not have a detachable modular design, problems may arise in terms of ease of transport and storage due to the volumetric stability of the toy. As can be seen, material stability, which is an indirect result of the stable volume feature of PE foam, and which provides significant advantages such as buoyancy, durability and usage safety, can also turn into a relative disadvantage in terms of ease of use.

- **4th Research Question:** “What could be the conceptual starting points for the design of an aquatic toy where PE pool noodles are the main components?”

It has been mentioned before that designers can be inspired by an infinite number of tangible or abstract starting points while making their designs. As exemplified by the research and design processes of our study, some suggestive conceptual starting points for the design of RAT to be produced from PE pool noodles can also be obtained from historical and cultural elements in the most general sense. Examining the historical development of some authentic watercraft as material culture elements, provides various clues on the subjects such as material selection and determination of construction techniques in aquatic toy design. Popular culture elements such as cartoons and animated films inspire aquatic toy designs in terms of character and form design.

For example, the examination of authentic reed boat forms made with traditional construction techniques in many cultures has allowed us to explore PE noodles as up-to-date material interpretations for the construction technique and material selection of our toy proposal. PE pool noodles, which are generally used as stand-alone products, can also be considered as contemporary interpretations or alternatives of traditional boat

construction materials such as water reed, lotus, bamboo and logs, thanks to their long and flexible physical structures and buoyancy. Thus, it will be possible to adapt the traditional construction techniques used in authentic examples such as reed boats and log rafts to the industrial design of rideable aquatic toys.

Likewise, both the historical animal-headed prows of boats belonging to the maritime traditions of various ancient cultures and the “Vicky The Viking” cartoon series about the Vikings, one of these ancient cultures, inspired the character and form design of our toy proposal. Various design proposals, especially from the participants of our online surveys, once again demonstrated that cultural elements can offer rich design ideas in the conceptual design of RAT made of PE noodles.

CHAPTER 6

CONCLUSIONS

As it has been emphasized in the sections so far, it is observed that the RAT group is mostly composed of inflatable products throughout the aquatic toy market. One of the most reasonable explanations for this situation is that such products represent the general social perception of RAT. In other words, it can be said that inflatable aquatic toys are the most iconic, therefore the most known and preferred examples of the aquatic toy identity for the majority of the society, regardless of demographic factors such as age, gender and educational status etc. Our personal observations made during the research process and the findings of online surveys carried out clearly prove this situation.

In this study, it has been tried to evaluate the potential of PE pool noodles, which are used in various ways in daily life, to be a useful alternative toy production material to inflatable PVC toys in industrial rideable aquatic toy design. In line with this aim, a literature review was conducted to determine the scope of the research. The implementation project of the research was tried to be exemplified by the design process and some model production trials of a RAT proposal using PE pool noodles as the target material. The literature review also contributed to the design and production processes of our implementation example by creating a kind of infrastructure on cultural and technical issues.

The evaluation phase of our sample toy proposal was carried out through individual and limited user trials and online surveys. The data of the literature review has also been benefited when necessary in the preparation of these online surveys and in the evaluation of their results.

6.1. Implications

In our research, design and implementation processes, it can be said that we have achieved some of the research goals that we set at the beginning of our study, albeit within the possibilities.

The findings of the parent and expert surveys confirm our foresights that if our design idea is transformed into a final product by making some revisions, it will contribute to the individual development of children, especially their physical and cognitive development. At this point, it is understood that it becomes even more important to adopt a modular approach that will allow toy parts to be easily and securely disassembled and reassembled many times in order for our toy proposal to become an industrial or commercially viable final product. Thus, as can be understood from the findings of the parent survey, it will be possible to increase the preferability of the product by eliminating the concerns of potential buyers about the general ease of use of the product, such as portability, storability and ease of installation. A modular approach is also dominant in the production plan of our full-size trial model and small-size presentation mock-up, which we try to produce experimentally within the possibilities. However, the assembly methods adopted in our production process are not well suited to the easy disassembly and assembly function of parts, which is a relative result or income of the modular approach. The primary aim here is to evaluate the potential of PE pool noodles as a useful or suitable construction material in the production of rideable aquatic toys through physical models. In this sense, despite all the limitations and shortcomings of our implementation project, which was carried out to exemplify our design and production process, it can be said that PE pool noodles can still be useful alternative materials as structural components of a rideable aquatic toy in terms of their various physical material properties. At least the existence of similar commercial products or some amateur DIY projects confirms this claim. In addition, the results of the direct/first hand experiences we gained during the experimental use tests of our full-size draft hull model are other important proofs of our claim. Investigation of design solutions targeting the ease of assembly of the modular approaches may be the subject of new studies to be done in the future. Even so, for the suggestions section, we will also have some suggestions for solutions regarding this issue.

When the data of the expert survey are evaluated as a whole, it is understood that if our toy proposal is produced as a final product, the most appropriate user group in terms of compliance with the anthropometric and cognitive development of children will be children between the ages of 5-8. On the other hand, there are some expert opinions that expand the lower and upper age limits a little more, provided that all necessary precautions are taken. In particular, the expert opinion, which predicts that users over the age of 8 will not find our toy proposal interesting, can be considered as a significant warning. The reflections of this prediction are also observed in the answers of some children in the 7-13 age group who participated in the child survey: Accordingly, excluding some inconsistent/contradictory answers given by the participants in this age group, it is understood that they find our toy suggestion less interesting or not interesting at all, especially from the consistent answers of the children over the age of 10. However, it seems always possible for exceptional groups of more younger and older users, who are outside the specified age ranges in line with their different personal preferences and user abilities, to enjoy using our toy proposal.

When we look at the findings of the parent and child surveys, it is observed that some participants have adopted our toy suggestion as a preferable design idea, while the frequency of preference for inflatable aquatic toys due to product awareness is also quite high. In this sense, it can be said that “the concept of using PE pool noodles in the design of rideable aquatic toys”, which is tried to be exemplified through our toy proposal, should prove itself for a while against the familiar reputation of inflatable aquatic toys. However, this still does not mean that PE pool noodles are completely useless toy making materials for RAT design. The fact the same person had to undertake researcher, designer and practitioner missions in order to investigate the potential of PE noodles to be useful toy making materials caused the aquatic toy design processes that were tried to be sampled to proceed with more amateur methods. As a result of this, it is possible that the usage potentials of the target material could not be demonstrated effectively due to some design and application deficiencies of the project sample that is tried to be carried out. Instead, the potential of PE noodles as a useful aquatic toy making material can be more effectively exhibited through more professional design and implementation processes by a design team specializing in aquatic toy design.

6.2. Limitations of the Study

Some limitations of our study can be evaluated under two main headings: “Limitations on the Design and Construction Process” and “Limitations on Field Research”.

6.2.1. Limitations on the Design and Construction Process

Our thesis study is not a final product realization oriented project. The basis of the study is to exemplify the basic preparation stages before mass production in industrial product design, with the process of preparing the prototype draft proposed for an aquatic toy design using a targeted main construction material (PE foam pool noodles). The prepared mock-ups and draft models in this process were tried to be produced within the limited time, space and production possibilities and with mixed techniques based only on the personal dexterity of the designer/researcher. As a result of this, it can be said that some deficiencies and/or problems have been experienced in terms of design, implementation and evaluation phases.

As mentioned earlier, the design process followed for our thesis project required a slightly different progression from conventional industrial design methods and processes. One of the most defensible reasons for this case was that the possibility of prolonging the process of accessing design inputs such as user preferences and requirements, which could only be obtained through fieldwork, was foreseen as a strong risk factor in terms of the time constraint of our study. As a matter of fact, the global COVID-19 epidemic made it inevitably impossible to conduct the field studies, which were expected to constitute an important part of our study, face to face. For this reason, it can be said that, the changes made in some stages of the traditional design processes that were planned to be followed were conscious choices arising from necessity. As the process progressed, factors such as the emergence of technical impossibilities in the production of full-size and full-function prototypes and the time constraint of an implication-based thesis as a graduation project caused all processes to be shaped according to conditions. Accordingly, without the chance to obtain some valuable data from face-to-face surveys, the concept generation, sketch drawing, 3D modeling and

physical model making stages of the prototype model were completed according to some predictable/possible design criteria. In determining these design criteria, it has also been tried to benefit from the related literature frequently. And only after these stages, it was possible to present our toy proposal to the user and expert opinion through online surveys. As a result, it can be said that the processes and practices carried out in line with the conditions of that time tried to summarize some of the general methods of the industrial design discipline in an academic way through the design proposal of a rideable aquatic toy.

In terms of available possibilities, it was a necessity to carry out the production process in places far from each other. The necessity to use different places for the production stages resulted from both gaining the advantage of being close to a seasonal water source in the IzTech campus, where the usage trials will be held, and trying to use the already limited time productively outside of working hours. However, the transportation problems experienced due to this situation in the final assembly of the hull and keel, which were produced in different places, caused the draft of a usable prototype to not be completed. Therefore, the production process of the full-size draft model were only be able to consist of making the hull and some keel parts separately. As a result, the only completed output of the physical model construction phase of our project is a scaled-down model work, which is a representation of our toy proposal.

PE pool noodles, which are the subject of the study, were used as the main material in the construction of the full-size draft hull mock-up and the hull part of the scaled down model. However, demo materials such as plywood, metal screws, PVC water pipes and waste CDs, which cannot be preferred in terms of structural strength and visual presentation of the product in a possible final product proposal, were used in the production of some functional and visual elements of scaled down model. Some of them are not resistant to water, moreover, if they are used in the manufacture of a possible end product, they will increase the weight of the product and provide a disadvantage in terms of the general use of the toy. Therefore, it can be said that our preferential purpose in using demo materials at this stage is to physically visualize or embody our design ideas as effectively, practically and economically as possible.

Textile fasteners in the form of strips and nylon ropes are used in the construction of the full-size draft hull and the small-scale model. In the design plan, the pool noodles forming the hull with a certain stacking order, and the keel, which includes the head and tail sections, is combined with the PE noodle hull, thanks to the ring-

shaped clamps made of elastic textile strips (Each ring is obtained as a result of sewing the ends of an elastic textile strip with a width of about 6-7 cm and a length of 35-40 cm.). In this method, elastic strips are used as a kind of fixed clamp for assembly stability and protection of structural integrity of the hull made of PE noodles consisting of 7 rows.

The use of such clamps, as a more stable connection option, also causes crushing in the connection areas of the PE pool noodles as a disadvantage at the same time. In order to prevent such deformations, it would be appropriate to support the foam material with rings made of hard plastic in the joints where the clamps will be used. All this assembly work will require dexterity and some muscle strength as well. In this sense, it can be said that the method is not very suitable for continuous and easy disassembly and assembly in terms of installation practicality. However, it is predicted that this joining method will offer a more guarantee option in terms of durability, considering the most extreme usage deformations that may be caused by users with different usage habits (the extent of possible deformations cannot be known without trials). The biggest handicap of this situation is the packaging, transportation and storage problems that will arise from the dimensions of the product if it is sold as a single piece. As a result, examples of industrial products such as with pedal or battery-operated cars for children, children's bicycles, canoes in the market are not generally dismountable products. Therefore, they are packaged and sold as assembled end products. It is clear that if our project proposal is an unassembled final product, it will fall into the category of products given in the examples in terms of the dimensional handicaps mentioned above.

However, an important design problem encountered during the construction of our full-size model sketch is the difficulty of developing a suitable modular structure that will allow the toy parts to be disassembled and reassembled repeatedly without compromising the physical integrity of the PE foam material. During our model making trials, it was decided that the safest way to preserve the physical integrity and strength of the PE foam material, and therefore the toy, is to permanently bond the pool noodles with elastic textile straps/bands. The biggest possible disadvantage of this situation is that it causes transportation and storage problems due to the size of the toy. Especially in the parent and child surveys, it is seen that some participants expressed their concerns about this.

6.2.2. Limitations on Field Research

The field research was originally planned to be conducted by face-to-face interview method. For this, a preliminary meeting was held with the officials at the Çiğli/İzmir branch of TEGV (Turkish Education Volunteers Foundation) at the beginning of March 2020. However, this plan had to be abandoned due to the Global COVID-19 epidemic that started in the same period. Instead, three separate online surveys were prepared for children, parents and expert participants, mostly educators working in the field of pre-school education and child development. Thus, a new preparation process has begun for adapting the question sets previously prepared for face-to-face interviews to the online survey system. Afterwards, it was necessary to spend a very long time for the application, data collection and evaluation stages of online surveys. In these respects, the fact that these online survey studies, which form the basis of the field research, cannot be done repeatedly can be considered as another limitation of the research process. It can be said that the most likely reason for this situation is the reluctance of the participants to participate in online surveys in general. The fact that the number of participants was less than expected during the 2 months and the general interest and perception levels of the participants while answering the surveys were mediocre, which led us to reach this conclusion. On the other hand, the fact that the necessary corrections could not be made in the question sets due to the technical and temporal constraints of our thesis research may have caused some questions to be similar in content and some questions not to be perceived clearly by the participants. At this point, as a self-critical suggestion, it can be accepted that further simplification of some survey sections such as demographic questions in terms of format, content and number will provide more efficient and meaningful results, especially in the data evaluation phase. As a matter of fact, another reason why the question sets are too comprehensive, which can also be characterized as an implementation error, is that the data collection process cannot be repeated due to the time constraints of the study and the prediction that future participation rates will decrease further. Although it is aimed to reach as much data as possible at once in this way, it can be said that the method does not provide as much efficiency as expected as a result. As a result, the survey study was terminated after approximately 2 months for each participant group, as there were no new participants.

User trials which was planned with a large number of child users could not be carried out due to the fact that a working prototype of the final product could not be completed due to both the global epidemic restrictions and the technical problems caused by manufacturing and assembly. Instead, some personal testing attempts were made within the possibilities and seasonal conditions. The method followed during these test attempts was the use of the full-size draft hull made of pool noodles in water with a live weight represented by an adult individual (the designer himself) and fixed weights consisting of a few pieces of rock of unknown weight.

When we look at the findings of our field studies, which consist of online survey answers, it is seen that some participant answers support our view on material selection, while some answers do not support our view or express indecisiveness about it. It can be said that this situation is related to the fact that a ready-to-use full-size trial model could not be completed due to technical, physical production possibilities and social conditions (such as global epidemic precautions/limitations). Therefore the participants were deprived of the chance to directly try our toy proposal. Moreover, even if a ready-to-use trial model had been completed, face-to-face user trials would not have been possible due to the mentioned reasons. Therefore, the presentation of our toy proposal to the participants was only possible through the product images and written explanations attached to the online surveys. Consequently, it can be said that this is one of the most likely reasons why some users have negative and/or ambiguous opinions about the general features of our design proposal and its construction material, despite all written explanations included in the online survey contents.

6.3. Subsequent Studies

It is possible to collect our suggestions for future studies on aquatic toy design under the following headings:

6.3.1. Recommendations on the Design and Usage Details of Our Toy Sample

In all three surveys, especially in the expert survey, it is seen that some design suggestions were made on the functional use and character and/or visual design of our toy proposal. One of the expert recommendations for the functional use of our toy sample is to use it classically with paddles for the cross-coordination of the hand and brain and the development of large muscles. Although the idea of operating our toy with a pedal is generally appreciated, the use of a foot pedal is more preferred than a hand pedal. In the context of visual/formal design, it is recommended to develop educational-instructional rideable aquatic toy designs that blend different themes such as Bandırma Ferry, Venetian gondola and various animal characters with storytelling, especially for children aged 3-5.

The idea of operating our toy proposal with a wheel mechanism connected to a hand pedal may at first glance seem like a disadvantage in terms of keeping children's hands busy during use. It is most likely a reflection of this bias that parents and experts suggest various usage scenarios, such as operating the toy with foot pedals and/or paddles. With this type of use we recommend, it is aimed that the children will focus better while handling the toy and gain the awareness and responsibility of driving safely. Compared to this, operating the toy with shovels is also another form of use that will keep children's hands busy. In addition, paddles, which are independent of the holistic structure of a rideable aquatic toy, are ancillary equipment that is often prone to loss.

Another reason for recommending the use of the hand pedal is that it is thought that children will find toys with mechanisms interesting. On the other hand, there is a strong possibility that children will already discover different usage scenarios, such as using the handwheel with the feet, through their own experiences.

As a result, when the participant suggestions are taken into consideration in terms of user satisfaction, various simplifications or revisions may be made in the movement mechanism or usage functions of the toy: Adding a steering mechanism to the tail section to steer the toy, floating the toy using a paddle, etc.

6.3.2. Recommendations for the Prototyping Process

Since the full-size trial model of our toy proposal has not been completed, the process of producing a fully functional final product prototype may be the subject of our another study in which we will reconsider in more detail. In this regard, another aquatic toy example, which is made of another type of polymer foam material known as EVA (Ethylene Vinyl Acetate), encountered after the completion of the material researches and design processes of our toy proposal, can be a useful reference for redesigning the hull structure of our toy proposal (see: Fig. 35D). This example is similar to our toy proposal in that the hull structure is in the form of a deep canoe or rowboat: The hull of the canoe has been produced by forming from cut flexible EVA sheets with a wall thickness of approximately 8-10 cm. Apparently, unlike the use of pool noodles in the hull construction, the one-piece structure of this material prevents the ingress of water into the user's compartment more. As seen through this example, the use of a different form of polymer foams in the design of an aquatic toy similar to our toy proposal supports that our choice of polymer foam group material is a suitable or at least developable alternative for RAT design.

As mentioned earlier, in order for our toy proposal to be a final product, it can be suggested that the prow, tail and keel sections, which provide the structural integrity of the hull and movement equipment should be designed as interlocking modules made of hardened plastic. In terms of reducing the weight of the toy, it is important that the hard plastic modules are produced in a hollow form. This method will also provide a solution for the packaging, storage and transportation problems of any RAT to be produced from PE noodles.

The thought-provoking aspect of the modular structure is the deformability problem of the materials, especially the PE pool noodles, as a result of continuous disassembly and assembly. In addition, the joints of the modules are generally risky sections in terms of the user weight being easily tolerated. In this respect, it may be recommended to design appropriate fastening systems in detail, taking into account the structural durability factor. An indirect problem of the modular system in the context of general toy production is that the costs of new molds increases the toy cost for each different toy piece to be produced from hardened PVC. For this reason, it may be a suitable option in terms of overall production costs to manufacture these toy parts that

require extra strength in a way that can be adapted to other toy designs to be produced from PE pool noodles.

The full-size hull draft of our design proposal, even in its incomplete form, does not yet meet the size standards declared in the general toy regulations (Unloaded length: approx. 212 cm). The main reason for this is that due to the flexible nature of PE pool noodles, the carrier hull exceeds the 120 cm limit when in the keelless and empty position. On the other hand, thanks to this flexible structure of the material, when the user enters the toy, the noodles will expand to the sides and the length of the toy will be shortened a little. However, as a more technical solution, if we add a fixed spine with suitable dimensions to our toy proposal, as mentioned above, our design draft may become compatible with the size standards of aquatic toys, since PE noodles will also remain stable in length despite their flexibility. On the other hand, since the length of the toy will be shortened, some new and dramatic adjustments will be required in the dimensions of the other structures that make up our toy proposal. Even in cases where these will not work, for example, in order to tolerate a possible spatial narrowing, it may be possible to remove the movement mechanism, which is one of the distinguishing features of this design, from the design plan and to narrow the age range of the target audience.

6.3.3. Recommendations for Subsequent Field Studies

Although the online survey method offers many conveniences, the effective revision of the draft question sets produced in the preparation phase in terms of format, content and number, can ensure that the final version of the survey is applied more appropriately for its purpose. Thus, the researcher will be able to reach more qualified and meaningful data during the evaluation process. In addition, it may be suggested to use digital software for automation instead of manual counting method for efficient and easy analysis and classification of the data obtained.

The findings of our children's survey showed that parents of illiterate minors assisting their children in answering questions is a highly useless method in terms of data reliability and originality. In this regard, it can be suggested that only the age range of participants who have the necessary qualifications for literacy proficiency should be included in the surveys that children will participate in, and that they should be asked to

give their own answers in writing directly. Thus, there will be no or minimal risk of their parents manipulating the original views and wishes of the children.

As another issue, it is recommended to reach as many participants as possible for any interview or survey to be carried out in order to make more meaningful and specific determinations. However, this is not always as easy as it seems. In this respect, it can be said that especially the online survey method is one of the methods that minimizes the control of the researchers in their attempts to increase the number of participants. Therefore, and if possible, it may be recommended to apply face-to-face interviews and survey methods because of the advantages such as being able to intervene in the process immediately and the opportunity to reach a large number of participants interactively at the same time in environments such as schools and courses, although it requires much more comprehensive preparation, preliminary interviews and organizations.

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- URL-16: https://cdn.shopify.com/s/files/1/1298/5195/products/two_20in_20water_1000_91d192c5-ef47-4db5-9b8a-0dfa67423db2_1024x.jpg?v=1541552779 acc.d.: 15.03.2021
- URL-17: <https://i.pinimg.com/originals/67/2f/2e/672f2e4496495723aa2840386173a3b2.jpg> acc.d.: 21.12.2020
- URL-18: <https://terraeantiquae.com/profiles/blogs/el-caballo-de-troya-era-un-barco-de-origen-fenicio?overrideMobileRedirect=1> acc.d.: 21.12.2020

URL-19: <https://i.pinimg.com/originals/d8/2f/10/d82f1020397fa39a85788f47f50a7efe.jpg> acc.d.: 29.06.2020

URL-20: <https://www.pinterest.co.uk/pin/438045501238198681/> acc.d.: 21.12.2020

URL-21: <https://www.pinterest.co.uk/pin/401313016778629071/> acc.d.: 21.12.2020

URL-22: <https://www.pinterest.es/pin/626633735629681069/> acc.d.: 25.09.2019

URL-23: <https://tuttleinafrica.files.wordpress.com/2012/07/dscf4460.jpg>
acc.d.: 25.09.2019

URL-24: https://www.wall-art.de/out/pictures/generated/product/2/780_780_80/wi1010-wandtattoo-wickie-set-einzel.jpg acc.d.: 29.06.2020

URL-25: <https://i.ebayimg.com/images/g/FngAAOSw3mpXFRwk/s-l1600.jpg>
acc.d.: 02.01.2020

URL-26: <https://trendehouse.com/wp-content/uploads/2020/05/Brilliant-Swimming-Pool-Design-Ideas-For-Kids-07.jpg> acc.d.: 02.01.2020

URL-27: https://www.youtube.com/watch?v=z__TPjLD10U acc.d.: 02.01.2020

URL-28: https://www.nordesco.com/a_01_2100_en.html acc.d.: 14.11.2020

URL-29: https://target.scene7.com/is/image/Target/GUEST_397192ba-392a-48fa-b08f-5a43d97c48d1?wid=488&hei=488&fmt=pjpeg acc.d.: 28.06.2020

URL-30: <https://ae01.alicdn.com/kf/HTB1csINaKT2gK0jSZFvq6xnFXXag.jpg>
acc.d.: 20.10.2020

URL-31: https://www.youtube.com/watch?v=z__TPjLD10U acc.d.: 02.01.2020

URL-32: <https://i.pinimg.com/originals/11/8a/c4/118ac4876a68b6ad1d9d7afb6088e124.jpg> acc.d.: 23.06.2020

URL-33: <http://youtube.com/watch?v=o4cu9-1ciPE> acc.d.: 23.06.2020

APPENDICES

APPENDIX A

ONLINE CHILD SURVEY

Yeni Bir Su Oyunağının Tasarım Önerisi İçin Havuz Makarnalarının Kullanım Potansiyelinin Arastırılması (Cocuk Kullanıcılar)

Bu anket, 5-14 yaş arası kullanıcıların su oyuncakları ile ilgili deneyim ve görüşleri hakkında bilgi toplamak amacıyla hazırlanmıştır.

Elde edilen veriler, Merter Yalçınkaya'nın hazırladığı "Sucul Oyuncak Tasarımında Polietilen Havuz Makarnalarının Alternatif Kullanımı İçin Bir Oyuncak Önerisi" isimli yüksek lisans tezinde değerlendirilecektir.

Anketin cevaplanması sırasında, verilen yaş aralığındaki her kullanıcının bilgisayar kullanma yetkinliği veya kişisel hesabı olmama olasılığı nedeniyle, bazı katılımcıların ebeveynlerinin yardımına gerek duyulacaktır. Anketin amacına ulaşabilmesi için, lütfen sadece çocuklarınızın kişisel görüşlerinin yansıtılmasına özen gösterin.

Tez çalışmamda önemli bir yer tutacak olan bu anket çalışmasına yapacağınız değerli katkılarınız için şimdiden çok teşekkür ederim.

* Gerekli

Figure 43. Introductory text of the online child survey (Turkish)

Table 22. Demographic question set of the online child survey (Turkish)

No	Soru	Yönerge/ler	Seçenekler
1	E-posta adresi *	---	(Açık uçlu)
5-14 Yaş Arası Kullanıcılar İçin Demografik Bilgiler LÜTFEN TÜM SORU ve AÇIKLAMALARI DİKKATLE OKUYUNUZ			
2	Adınız ve Soyadınız * Örneğin: Merter Y.	---	(Açık uçlu)
3	Cinsiyetiniz *	Bazı isimler her iki cinsiyet için de kullanılabilir, herhangi bir karışıklığı önlemek için bu seçenek eklenmiştir / Yalnızca bir şıkkı işaretleyin.	<ul style="list-style-type: none">• Kız• Erkek
4	Yaşınız *	---	(Açık uçlu)
5	Boyunuz *	---	(Açık uçlu)
6	Kilonuz *	---	(Açık uçlu)
7	Yaşadığımız şehir *	---	(Açık uçlu)

Table 23. Demographic question set of the online child survey (English)

No	Question	Instruction/s	Options
1	Your e-mail address *	---	(OpEn)
Demographic Information for Users Aged 5-14 PLEASE READ ALL QUESTIONS AND EXPLANATIONS CAREFULLY			
2	Your name * (e. g.: Merter Y.)	---	(OpEn)
3	Your gender *	Some nouns can be used for both genders, this option has been added to avoid any confusion / Tick only one option.	<ul style="list-style-type: none"> • Girl • Boy
4	Your age *	---	(OpEn)
5	Your length *	---	(OpEn)
6	Your weight *	---	(OpEn)
7	Your city of residence *	---	(OpEn)

Table 24. Question set of the online child survey (Turkish)

No	Soru	Yönerge/ler	Seçenekler
Çocukların Binilebilen Oyuncaklara ve Suyu İlgi Durumu (1.-4. sorular)			
1	Binilebilen/sürülebilen oyuncaklardan ilk aklınıza gelen 5 tanesi hangileridir? (* Gerekli)	---	(Açık uçlu)
2	Yaşınıza uygun binilebilen/sürülebilen oyuncakları kullanmakta ne kadar iyisiniz? *	Yalnızca bir şıkkı işaretleyin.	Hiç iyi değilim (1) 1 2 3 4 5 Oldukça iyiyim (5)
3	Suya girmeyi/yüzmeyi/suda eğlenmeyi ne kadar seversiniz? *	Yalnızca bir şıkkı işaretleyin.	Hiç sevmem (1) 1 2 3 4 5 Bayılırım (5)
4	En sevdiğiniz 5 deniz veya su taşıtı/aracı hangileri? *	Eğer "Hiçbiri" seçeneğini seçerseniz, cevaplarınızın çelişmemesi için başka işaretleme yapmayınız. / "Diğer" seçeneği de bu 5 kriterden birisi olabilir. Bu durumda ne olduğunu belirtmelisiniz. / Uygun olanların tümünü işaretleyin.	<ul style="list-style-type: none"> • Büyük tekneler (yolcu ve savaş gemileri/vapurlar vb) • Küçük tekneler (botlar, sandallar/kayıklar vb) • Yelkenliler (yat, katamaran, küçük antrenman yelkenlileri vb) • Sürat tekneleri (jet skiler, hovercraftlar vb) • Su altı motorsikletleri • Deniz bisikletleri • Denizaltılar • Hiçbiri • Diğer: ...
Binilebilen Su Oyuncakları (5.-15. sorular)			
5	Hiç binilebilen su oyuncuğunuz var mı veya oldu mu? *	Yalnızca bir şıkkı işaretleyin.	<ul style="list-style-type: none"> • Evet var/vardı • Hayır yok/hiç olmadı
6	En sevdiğiniz binilebilen su oyuncakları hangileridir? *	Bir önceki soruya "Hayır yok/hiç olmadı" cevabı verdiyseniz, bu soruyu geçmek için xxx yazın	(Açık uçlu)

(cont. on next page)

Table 24 (cont.)

7	En sevdiğiniz türden binilebilen su oyuncakları <u>çoğunlukla</u> hangi malzemeden yapılmıştır? *	Yalnızca bir şıkkı işaretleyin.	<ul style="list-style-type: none"> • Şişirilebilen, esnek, yumuşak ve renkli bir plastik malzemeden yapılmış • Köpük veya sünger gibi görünen, bükülebilen, yumuşak ve çeşitli renklerdeki bir malzemeden yapılmış • Sert plastik malzemeden yapılmış • Yukarıdaki malzemelerin hepsi bir arada kullanılmış
8	En sevdiğiniz binilebilen su oyuncağının şekli neye benziyor? *	Binilebilen bir su oyuncağımız yoksa /olmadıysa, bu soruyu geçmek için xxx yazın	(Açık uçlu)
9	En sevdiğiniz binilebilen su oyuncağının boyutları nasıl?	Binilebilen bir su oyuncağımız yoksa/olmadıysa, bu soruyu boş bırakın. Yalnızca bir şıkkı işaretleyin.	<p>Çok küçük/dar (1)</p> <p>1 2 3 4 5</p> <p>Çok büyük/geniş (5)</p>
10	Sökülüp takılabiliyor mu?	Binilebilen bir su oyuncağımız yoksa /olmadıysa, bu soruyu boş bırakın. Yalnızca bir şıkkı işaretleyin.	<ul style="list-style-type: none"> • Evet • Hayır
11	En sevdiğiniz binilebilen su oyuncağının taşınması kolay mı?	Binilebilen bir su oyuncağımız yoksa /olmadıysa, bu soruyu boş bırakın. Yalnızca bir şıkkı işaretleyin.	<ul style="list-style-type: none"> • Tek başıma kolayca taşıyabiliyorum • Büyük olduğu için tek başıma taşıyamıyorum • Ağır olduğu için tek başıma taşıyamıyorum • Hem büyük, hem de ağır olduğu için tek başıma taşıyamıyorum
12	En sevdiğiniz binilebilen su oyuncağınız alınırken seçimi kim yaptı?	Binilebilen bir su oyuncağımız yoksa /olmadıysa, bu soruyu boş bırakın. Yalnızca bir şıkkı işaretleyin.	<ul style="list-style-type: none"> • Kendim seçtim • Kendim seçmedim • Ailemle beraber seçtik • Hatırlamıyorum
13	Binilebilen herhangi bir su oyuncağını kullanırken kendinizi ne kadar güvende hissedersiniz?	Daha önce herhangi bir su oyuncağına binmediyseniz bu soruyu boş bırakabilirsiniz. Yalnızca bir şıkkı işaretleyin.	<p>Hiç (1)</p> <p>1 2 3 4 5</p> <p>Oldukça fazla (5)</p>
14	Binilebilen su oyuncaklarının en sevdiğiniz 5 özelliği nelerdir? *	Bu soru, kendi oyuncağımız olmasını gerektirmeyen genel bir sorudur. Herhangi bir fikriniz yoksa xxx yazın.	(Açık uçlu)
15	Aşağıdakilerden hangisini tercih edersiniz? *	Yalnızca bir şıkkı işaretleyin.	<ul style="list-style-type: none"> • Sadece benim bineceğim, tek kişilik bir su oyuncağı • Arkadaşlarımla beraber bineceğim, çok kişilik bir su oyuncağı
Binilebilen Şişme Su Oyuncakları (16.-17. sorular)			
16	Ailenizin size binilebilen şişme bir su oyuncağı almasını ne kadar istersiniz? *	Yalnızca bir şıkkı işaretleyin.	<p>Hiç istemem (1)</p> <p>1 2 3 4 5</p> <p>Oldukça çok isterim (5)</p>
17	Nasıl bir şişme su oyuncağınız olsun istersiniz? Mesela şekli neye benzesin? *	Bir önceki soruya en az 2 puan verdiyseniz, bu soruyu geçmek için xxx yazın.	(Açık uçlu)

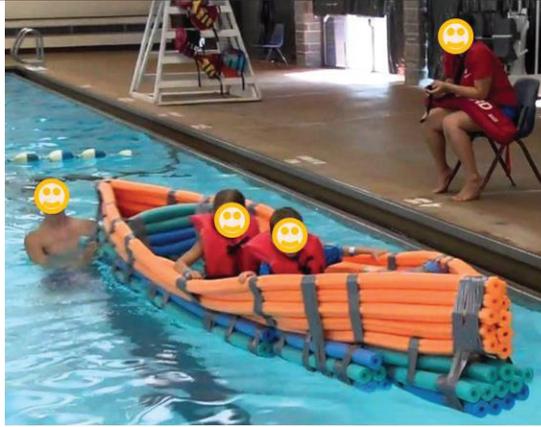
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Table 24 (cont.)

Havuz Makarnaları (18.-20. sorular)			
Havuz makarnaları, “deniz makarnası”, “yüzme makarnası”, “sosis” gibi değişik adlarla da bilinirler.			
18	Daha önce hiç havuz/deniz makarnası gördünüz veya kullandınız mı? *	Yalnızca bir şıkkı işaretleyin.	<ul style="list-style-type: none">• Sadece görmüştüm• Gördüm ve kullandım• Daha önce görmedim veya kullanmadım
19	Havuz makarnaları neye benzer, nasıl bir malzemeden yapılırlar? *	“Daha önce görmedim veya kullanmadım” dediyse, bu soruyu geçmek için xxx yazın.	(Açık uçlu)
20	Siz havuz makarnasıyla neler yaptınız, nerede ve nasıl kullandınız? *	Bu soruda birden çok seçim yapabilirsiniz. Ancak cevabınız “Hiç kullanmadım” olacaksa, başka seçenekleri işaretlemeyin. / Uygun olanların tümünü işaretleyin.	<ul style="list-style-type: none">• Yüzme öğrenirken su üstünde kalmak için kullandım• Suda oynamak veya eğlenmek için kullandım• Spor hareketleri yaparken yardımcı eşya olarak kullandım• Okul veya hobi projeleri yaparken malzeme olarak kullandım• Hiç kullanmadım
Havuz Makarnasından Binilebilen Su Oyuncakları Yapılır Mı Hiç??? (21.-24. sorular)			
Ne dersiniz? Haydi beraber görelim...			
21	Hiç havuz makarnalarından yapılan ve binilebilen su oyuncakları gördünüz veya kullandınız mı? *	Yalnızca bir şıkkı işaretleyin.	<ul style="list-style-type: none">• Sadece gördüm• Kullandım• Hiç görmedim
22	Havuz makarnalarından yapılan ve binilebilen bir su oyuncakı gördünüz veya kullandınız ise nasıl bir oyuncaktı, neye benziyordu? *	Hiç görmediyseniz/ kullanmadıysanız, bu soruyu geçmek için xxx yazın	(Açık uçlu)
23	Havuz makarnalarından yapılan ve binilebilen bir su oyuncakı gördünüz veya kullandınız ise neler hissettiniz? *	Cevabınız “Hiç görmedim/kullanmadım” olacaksa, diğer seçenekleri “Hayır” olarak işaretleyin. / Her satırda yalnızca bir şıkkı işaretleyin.	<ul style="list-style-type: none">• Korku• Heyecan• Eğlence/neşe/mutluluk• Hız tutkusu• Beğeni• Güvende olma• Kendime güven• Kullanma kolaylığı• Keşfetme isteği• Sahip olma isteği• Rahatlık• Özgürlük hissi• Macerada olmak gibi• Hiç görmedim/ kullanmadım
24	Siz de havuz makarnasından yapılmış ve binilebilen bir su oyuncakınız olsun ister misiniz? *	Yalnızca bir şıkkı işaretleyin.	<ul style="list-style-type: none">• Evet• Hayır• Kararsızım

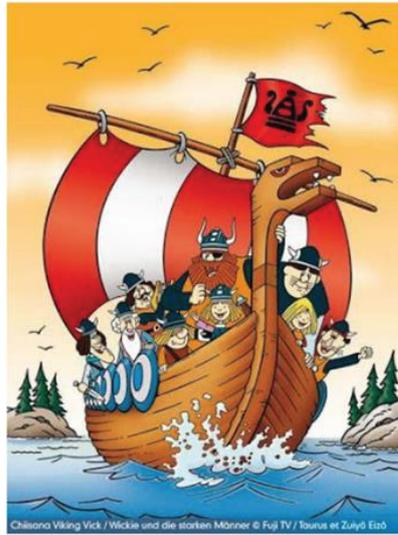
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Table 24 (cont.)



Sizin için kısa bir video... Daha önce havuz makarnalarından yapılmış bir botun kullanım örneği.
YES Camp 2013 Noodle Canoe (https://www.youtube.com/watch?v=z_TPjLD10U acc.d.: 02.01.2020)

Vicky The Viking: Vicky ve arkadaşlarının maceraları...



<http://youtube.com/watch?v=o4cu9-1ciPE>

(<https://i.pinimg.com/originals/11/8a/c4/118ac4876a68b6ad1d9d7afb6088e124.jpg> acc.d.: 23.06.2020)

(<http://youtube.com/watch?v=o4cu9-1ciPE> acc.d.: 23.06.2020)

Yaşasın!!! Çizgi Film... (25.-27. sorular)

Vicky The Viking: Vicky ve arkadaşlarının maceraları... (<http://youtube.com/watch?v=o4cu9-1ciPE>)

25	Çizgi film veya animasyon film ya da çizgi roman karakterleriyle ilgili oyuncakları sever misiniz? *	Yalnızca bir şıkkı işaretleyin.	<ul style="list-style-type: none"> • Severim • Sevmem • Kararsızım
26	Vikingleri ve gemilerini biliyor musunuz? *	Yalnızca bir şıkkı işaretleyin.	<ul style="list-style-type: none"> • Evet, biliyorum • Hayır, bilmiyorum

(cont. on next page)

Table 24 (cont.)

27	Hiç “Vicky ve Vikingler” (Vicky The Viking) çizgi filmini, animasyon filmini veya sinema filmini izlediniz mi? *	Her satırda yalnızca bir şıkkı işaretleyin.	<ul style="list-style-type: none"> • Çizgi filmini izledim • Animasyon filmini izledim • Sinema filmini izledim 	<u>E</u>	<u>H</u>
<p>3D Sanal Model Görselleri ve Fotoğrafları ile Oyuncak Önerimizin Sunumu</p> <p>Son bölüm... Bitirmeye az kaldı :) (28.-34. sorular)</p> <p>Bu bölümde size havuz makarnalarıyla yapılmış ve binilebilen yeni bir su oyuncuğuyla ilgili sorular sorulacaktır. Burada gördüğünüz görseller, oyuncuğun bilgisayarda modellenmiş çizimleri ve küçük boy taslak maketidir. Oyuncuğun neye benzeyeceği konusunda size fikir vermeleri amaçlanmaktadır. (Tasarım-3D CAD Modelleme-Maket Yapımı: Merter YALÇINKAYA)</p>					
 					
<ul style="list-style-type: none"> • DREKAR (Ejderha)... Eski çağlarda Viking savaş gemilerine bu isim verilirdi. Bu binilebilen su oyuncuğu, kayık biçiminde oyuncak bir bot ve el çarkıyla çalıştırılan bir tür deniz bisikleti olarak tasarlanmıştır. Gövde bölümü havuz makarnalarından oluşmaktadır. Diğer bölümler için hafif ancak dayanıklı biçimde tasarlanan sert plastik kullanılması planlanmaktadır. • Küçük ölçekli bu maket, fikir verici bir taslaktır. Bu nedenle ahşap, metal vida, atık CD, izolasyon bandı, tekstil ve strafor gibi son üründe kullanılması düşünülmeyen malzemelerden üretilmiştir. • Oyuncuğun tam boyunun yaklaşık 212cm uzunluğunda ve yaklaşık 150 cm yüksekliğinde olması öngörülmektedir. Ağırlık bilgisi mevcut değildir. Tüm diğer su oyuncakları gibi en az 1 yetişkin gözetiminde ve tercihen şişme yelek gibi can kurtaran ekipmanları eşliğinde kullanılmalıdır. Güvenlik açısından en çok 1 kişinin kullanımına uygundur. 					
28	Resimlerde maketini gördüğünüz oyuncak Viking gemisini ne kadar beğendiniz? *	Yalnızca bir şıkkı işaretleyin.	Hiç beğenmedim (1) 1 2 3 4 5 Bayıldım (5)		
29	Bu oyuncuğu suda kullanmakla ilgili ne söylersiniz? *	Yalnızca bir şıkkı işaretleyin.	<ul style="list-style-type: none"> • Çok hoşuma gider, beni eğlendirir ve kendimi güvende hissedebilirim • Denemeyi çok isterim, eğlenceli olabilir ama yine de kendimi çok güvende hissedemem • Hiç hoşuma gitmez, beni korkutur ve kendimi hiç güvende hissedemem 		
30	Binilebilen başka su oyuncakları arasında bu Viking gemisi kaçınıcı tercihiniz olur? *	Yalnızca bir şıkkı işaretleyin.	<ul style="list-style-type: none"> • İlk tercihim • 2. tercihim • 3. tercihim • 4. tercihim • 5. tercihim • Hiçbiri 		

(cont. on next page)

Table 24 (cont.)

31	Aşağıdakilerden en çok hangisini istersiniz? *	Yalnızca bir şıkkı işaretleyin.	<ul style="list-style-type: none"> • Şişme bir su oyuncağını • Deniz makarnasından yapılan görsellerdeki Viking gemisini • Deniz makarnasından yapılan başka bir binilebilen su oyuncağını • Hiçbirini
32	Bu oyuncak Viking gemisinin EN BEĞENDİĞİNİZ 5 özelliği nedir? *	---	(Açık uçlu)
33	Bu oyuncak Viking gemisinin EN BEĞENMEDİĞİNİZ 5 özelliği nedir? *	---	(Açık uçlu)
34	Sizce bu Viking gemisine başka özellikler eklemek veya onun bazı özelliklerini değiştirmek gerekir mi? *	---	(Açık uçlu)
Onay Sorusu			
35	SON olarak, tüm soruları dikkatle okuyup cevapladığınızı onaylamak için (B) şıkkını işaretler misiniz? *	Yalnızca bir şıkkı işaretleyin.	(A) Çok yararlı bir anketti, çok eğlendim (B) Çok uzun bir anketti, çok sıkıldım
Tebrikler, anketi tamamladınız			
Umarım son soruda sizden istenildiği gibi cevap verseniz de gerçekten çok fazla sıkılmamışsınızdır. Emek vererek anketi tamamladığınız için çok teşekkür ederim.			

Table 25. Question set of the online child survey (English)

No	Question	Instruction/s	Options
Children's Interest in Rideable Toys and Water (1st-4th questions)			
1	What are the 5 rideable toys that come to your mind first? (* Necessary)	---	(OpEn)
2	How good are you at using rideable toys appropriate for your age? *	Tick only one option.	I'm never good at this (1) 1 2 3 4 5 I'm pretty good at this (5)
3	How much do you like to get into the water? *	Tick only one option.	I never like (1) 1 2 3 4 5 I love this (5)
4	What are your 5 favorite watercrafts/vehicles? *	If you choose "None", do not mark any further so that your answers do not conflict. / The "Other" option can also be one of these 5 criteria. In this case, you must specify what it is. / Tick all that apply.	<ul style="list-style-type: none"> • Large boats (passenger and warships/ steamships etc.) • Small boats (boats, dinghys/kayaks, etc.) • Sailboats (yachts, catamarans, small training sailboats, etc.) • Speedboats (jet skis, hovercrafts etc.) • Underwater motorcycles • Sea bikes • Submarines • None • Other: ...

(cont. on next page)

Table 25 (cont.)

Rideable Aquatic Toys (5th-15th questions)			
5	Do you have or have you ever had a rideable aquatic toy? *	Tick only one option.	<ul style="list-style-type: none"> • Yes there is/was • No, there is not/was not
6	What are your favorite rideable aquatic toys? *	If you answered “No, there is not/was not” to the previous question, type “xxx” to skip this question.	(OpEn)
7	What material are your favorite rideable aquatic toys <u>mostly</u> made of? *	Tick only one option.	<ul style="list-style-type: none"> • Made of an inflatable, flexible, soft and colorful plastic material • Made of a flexible, soft, multicolored material that looks like foam or sponge • Made of hard plastic material • All of the above materials are used together
8	What does look like the shape of your favorite rideable aquatic toy? *	If you don’t have a rideable aquatic toy, type “xxx” to skip this question.	(OpEn)
9	What are the dimensions of your favorite rideable aquatic toy?	If you don’t have a rideable aquatic toy, skip this question. Tick only one option.	Too small/narrow (1) 1 2 3 4 5 Too big/large (5)
10	Can it be assembled and disassembled?	If you don’t have a rideable aquatic toy, skip this question. Tick only one option.	<ul style="list-style-type: none"> • Yes • No
11	Is your favorite rideable aquatic toy easy to carry?	If you don’t have a rideable aquatic toy, skip this question. Tick only one option.	<ul style="list-style-type: none"> • I can carry it alone easily • I can’t carry it alone because it’s big • I can’t carry it alone because it’s heavy • I can’t carry it alone because it’s both big and heavy
12	Who made the choice when buying your favorite rideable aquatic toy?	If you don’t have a rideable aquatic toy, skip this question. Tick only one option.	<ul style="list-style-type: none"> • I chose myself • I didn’t choose myself • Chosen with my family • I don’t remember
13	How safe do you feel using any rideable aquatic toy?	Skip this question if you haven’t ridden any aquatic toy before. Tick only one option.	Never (1) 1 2 3 4 5 Pretty much (5)
14	What are your 5 favorite features of rideable aquatic toys? *	This is a general question that doesn’t require you to have your own toy. Type “xxx” if you have no idea.	(OpEn)
15	Which one of the following would you prefer? *	Tick only one option.	<ul style="list-style-type: none"> • A one-person aquatic toy that only I can ride-on • A multi-person aquatic toy that I can ride-on with my friends
Rideable Inflatable Aquatic Toys (16th-17th questions)			
16	How much would you like your family to buy you a rideable inflatable aquatic toy? *	Tick only one option.	I never want (1) 1 2 3 4 5 I would very much like (5)
17	What kind of inflatable aquatic toy would you like to have? For example, what would its shape look like? *	If you gave at least 2 points to the previous question, type “xxx” to skip this question.	(OpEn)

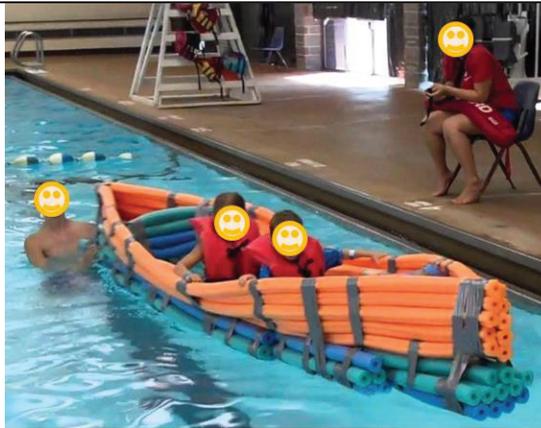
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Table 25 (cont.)

Pool Noodles (18th-20th questions)						
Pool noodles are also known by different names such as “sea noodles”, “swimming noodles”, “sausage”.						
18	Have you ever seen or used pool/sea noodles? *	Tick only one option.	<ul style="list-style-type: none"> • I’ve only seen • I’ve seen and used • I’ve never seen and used 			
19	What do pool noodles look like, what kind of material are they made of? *	If you said “I’ve never seen or used”, type “xxx” to skip this question.	(OpEn)			
20	What did you do with the pool noodles, where and how did you use them? *	You can make multiple choices in this question. However, if your answer is “I’ve never used”, do not tick any other options. / Tick all that apply.	<ul style="list-style-type: none"> • I used it to stay afloat while learning to swim. • I used it to play or have fun while in the water • I used it as an assistant equipment while doing sport • I used it as a material for my hobby or class projects • I’ve never used it 			
Can Rideable Aquatic Toys Ever Be Made From Pool Noodles???? (21th-24th questions)						
What about? Let’s see together!!!...						
21	Have you ever seen or used rideable aquatic toys made from pool noodles? *	Tick only one option.	<ul style="list-style-type: none"> • I’ve only seen • I’ve used • I’ve never seen 			
22	If you have seen or used a rideable aquatic toy made from pool noodles, what kind of toy was it and what did it look like? *	If you’ve never seen/used it, type “xxx” to skip this question.	(OpEn)			
23	How did you feel if you saw or used a rideable aquatic toy made from pool noodles? *	If your answer is “I’ve never seen/used”, tick the other options as “No”. / Tick only one option per line.	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;"> <ul style="list-style-type: none"> • Fear • Excitement • Fun/Joy/Happiness • Passion for speed • Admiration • Being safe • Self-confidence • Ease of use • Desire to explore • Desire to possess • Comfortability • Feeling of freedom • Like being in an adventure • I’ve never seen/used </td> <td style="width: 30px; text-align: center; vertical-align: middle;"><u>Y</u></td> <td style="width: 30px; text-align: center; vertical-align: middle;"><u>N</u></td> </tr> </table>	<ul style="list-style-type: none"> • Fear • Excitement • Fun/Joy/Happiness • Passion for speed • Admiration • Being safe • Self-confidence • Ease of use • Desire to explore • Desire to possess • Comfortability • Feeling of freedom • Like being in an adventure • I’ve never seen/used 	<u>Y</u>	<u>N</u>
<ul style="list-style-type: none"> • Fear • Excitement • Fun/Joy/Happiness • Passion for speed • Admiration • Being safe • Self-confidence • Ease of use • Desire to explore • Desire to possess • Comfortability • Feeling of freedom • Like being in an adventure • I’ve never seen/used 	<u>Y</u>	<u>N</u>				
24	Would you like to have a rideable aquatic toy made from pool noodles? *	Tick only one option.	<ul style="list-style-type: none"> • Yes • No • I’m undecided 			

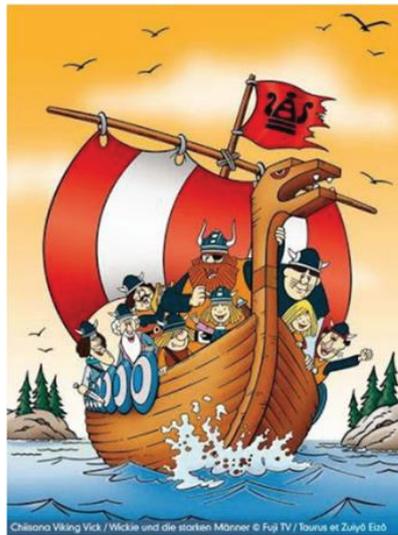
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Table 25 (cont.)



A short video show for you... Example of use of a boat that was previously made from pool noodles. YES Camp 2013 Noodle Canoe (https://www.youtube.com/watch?v=z_TPjLD10U acc.d.: 02.01.2020)

Vicky The Viking: Vicky ve arkadaşlarının maceraları...



<http://youtube.com/watch?v=o4cu9-1ciPE>

(<https://i.pinimg.com/originals/11/8a/c4/118ac4876a68b6ad1d9d7afb6088e124.jpg> acc.d.: 23.06.2020)

(<http://youtube.com/watch?v=o4cu9-1ciPE> acc.d.: 23.06.2020)

Hurrah!!! Cartooooon!!!!... (25th-27th questions)

Vicky The Viking: The Adventures of Vicky and his friends... (<http://youtube.com/watch?v=o4cu9-1ciPE>)

25	Do you like toys about cartoon, animated movie or comic book characters? *	Tick only one option.	<ul style="list-style-type: none"> • I like • I don't like • I'm undecided
26	Do you know the Vikings and their ships? *	Tick only one option.	<ul style="list-style-type: none"> • Yes, I know • No, I don't

(cont. on next page)

Table 25 (cont.)

27	Have you ever watched the “Vicky The Viking” cartoon, animated movie or movie on TV or in the cinema? *	Tick only one option per line.	<ul style="list-style-type: none"> • I’ve watched its cartoon • I’ve watched its animated movie • I’ve watched its movie 	<u>Yes</u>	<u>No</u>
<p><u>Presentation of Our Toy Proposal with 3D Virtual Model Images & Photos</u></p> <p>Last section... Almost finished :) (28th-34th questions)</p> <p>In this section you will be asked questions about a new rideable aquatic toy made from pool noodles. The images you see here are computer-modeled drawings of the toy and photos of its small-size sketch model. They are intended to give you an idea of what the toy will look like. (Design-3D CAD Modeling-Model Making: Merter YALÇINKAYA)</p> <div style="text-align: center;">   </div> <ul style="list-style-type: none"> • DREKAR (Dragon)... This was the name given to Viking warships in ancient times. This rideable aquatic toy is designed as a toy boat in the form of a dinghy and a kind of handwheel operated sea bike. The hull part consists of pool noodles. For other parts, it is planned to use rigid plastic designed to be lightweight but durable. • This small scale model is an inspiring sketch. For this reason it has made from materials not intended for use in the final product, such as wood, metal screws, waste CDs, insulation tape, textiles, and styrofoam. • It is envisaged that the length of the toy is approximately 212 cm and the height is approximately 150 cm. Weight information is not yet available. Like all other aquatic toys, it should be used under the supervision of at least 1 adult and preferably accompanied by lifesaving equipment such as inflatable vests. In terms of safety, it is suitable for use by 1 person at most. 					
28	How much did you like the toy Viking ship whose model you see in the pictures? *	Tick only one option.	I didn’t like it at all (1) 1 2 3 4 5 I love it (5)		
29	What would you say about using this toy in water? *	Tick only one option.	<ul style="list-style-type: none"> • I would like it very much, it could entertain me and I would feel safe • I would love to try it, it might be fun but I wouldn’t feel very safe • I wouldn’t like it, it would scare me and I would never feel safe 		
30	What rank does this toy Viking ship rank among the other rideable aquatic toys on your preference list? *	Tick only one option.	<ul style="list-style-type: none"> • 1st • 2nd • 3th • 4th • 5th • None 		

(cont. on next page)

Table 25 (cont.)

31	Which of the following would you like most? *	Tick only one option.	<ul style="list-style-type: none"> • An inflatable aquatic toy • Viking ship made of pool noodles shown in the images • Another rideable aquatic toy made of pool noodles • None of them
32	What are the “5 things you like” about this toy Viking ship? *	----	(OpEn)
33	What are the “5 things you dislike” about this toy Viking ship? *	---	(OpEn)
34	Do you think it is necessary to add other features to this Viking ship or change some of its features? *	---	(OpEn)
Confirmative Question			
35	FINALLY, could you tick option (B) to confirm that you have carefully read and answered all questions? *	Tick only one option.	(A) It was a very useful survey, I had a lot of fun (B) It was such a long survey, I was so bored
Congratulations, you have completed the survey!!! I hope you didn't get bored too much even though you answered the last question as requested. Thank you very much for your hard work and completing the survey.			

APPENDIX B

ONLINE PARENT SURVEY

Ebeveyn Anketi	
<u>Yeni Bir Su Oyuncağının Tasarım Önerisi İçin Havuz Makarnalarının Kullanım Potansiyelinin Araştırılması</u>	
<p>Bu çalışma, su oyuncakları tasarımında alternatif bir malzeme olarak düşünülen havuz makarnalarının kullanım potansiyellerinin anlaşılması ve kullanıcıların bu konudaki görüşlerinin alınması amacıyla yapılmaktadır. Araştırma, bu konuda hazırlanan tez çalışmasına önemli katkı sağlayacağı için vereceğiniz cevapların sizin gerçek ve kişisel görüşlerinizi yansıtmaması, anketin tutarlılığı ve güvenilirliği bakımından son derece önemlidir. Bu anlamda yöneltilen soruların, kişisel hassasiyetlere elden geldiğince özen gösterilerek hazırlanmasına çalışılmıştır. Bu bakımdan anketteki tüm sorulara içtenlikle cevap verebileceğinizi umarım.</p> <p>Bu anket, 5-14 yaş arası çocukların ebeveynleri ve/ya bakımlarından sorumlu kişiler için hazırlanmıştır.</p> <p>* Gerekli</p>	

Figure 44. Introductory text of the online parent survey (Turkish)

Table 26. Demographic question set of the online parent survey (Turkish)

No	Soru	Yönerge/ler	Cevaplar/ Seçenekler
1	E-posta adresi *	---	(Açık uçlu)
Ebeveyn İçin Demografik Bilgiler			
Demografik bilgiler, anket araştırmalarının önemli ve vazgeçilmez unsurlarıdır. Araştırma konusuyla ilgili sosyal-kültürel ve sosyalekonomik analizler yapabilmek için gerekli ipuçları sunarlar.			
2	Adınız * (Örneğin: Merter Y.)	---	(Açık uçlu)
3	Cinsiyetiniz *	Yalnızca bir şıkkı işaretleyin.	<ul style="list-style-type: none">• Kadın• Erkek• Bu bilgi bana kalsın
4	Yaş Aralığınız *	Yalnızca bir şıkkı işaretleyin.	<ul style="list-style-type: none">• 20-30• 31-40• 41-50• 51 ve üstü
5	Yaşadığınız Şehir *	---	(Açık uçlu)
6	5-14 yaş arası çocuklarınızın yaşı ve cinsiyeti (Ör. 12-K, 10-E, 5-K gibi, büyükten küçüğe yazabilirsiniz.) (K: kız E: erkek) *	Anne-babası olmasanız bile bakım sorumluluğunu üstlendiğiniz çocuklar (torun, yeğen vb.) da dahil	(Açık uçlu)
7	Ebeveynlik Durumunuz *	Yalnızca bir şıkkı işaretleyin.	<ul style="list-style-type: none">• Anne-baba• Anneanne/Babaanne-Dede/Büyükbaba• Diğer: ...
8	Medeni durumunuz	Bu soru için özel bir hassasiyetiniz yoksa lütfen cevaplayınız / Yalnızca bir şıkkı işaretleyin.	<ul style="list-style-type: none">• Evliyim• Eşimden ayrıldım• Eşim vefat etti• (Anne-Baba dışındaki olası aile bireyleri için) Bekarım• Diğer: ...

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Table 26 (cont.)

9	Eğitim durumunuz	Her satırda yalnızca bir şıkkı işaretleyin.		Devam	Terk	Mezun
			İlköğr.			
			Ortaöğr.			
			Yükseköğr.			
			Diğer			
10	Mesleğiniz *	---	(Açık uçlu)			
11	Çalışma durumunuz *	Yalnızca bir şıkkı işaretleyin.	<ul style="list-style-type: none"> • Çalışıyorum (tam zamanlı) • Çalışıyorum (ek işim var) • Çalışıyorum (kısmi zamanlı/part-time) • Çalışmıyorum • Emekliyim • Diğer: ... 			
12	Ailenizin toplam aylık gelirini hangi aralıkta tanımlarsınız?	Yalnızca bir şıkkı işaretleyin.	<ul style="list-style-type: none"> • 0-1000 TL • 1000-2000 TL • 2000-3000 TL • 3000 TL ve üstü 			

Table 27. Demographic question set of the online parent survey (English)

No	Question	Instruction/s	Answers/ Options
1	Your e-mail address *	---	OpEn
Demographic Information for Parents			
Demographic information is an important and indispensable element of surveys. They provide necessary clues to be able to make socio-cultural and social-economic analyzes related to the research topic.			
2	Your name * (e. g.: Merter Y.)	---	OpEn
3	Your gender *	Tick only one option	<ul style="list-style-type: none"> • Female • Male • Let me keep this information
4	Your age range *	Tick only one option	<ul style="list-style-type: none"> • 20-30 • 31-40 • 41-50 • 51 and above
5	Your city of residence *	---	OpEn
6	Age and gender of your children aged 5-14 (e. g.: 12-G, 10-B, 5-G, you can write from older to younger.) (G: girl B: boy) *	Even if you are not a parent, including the children you care for (grandchildren, nephews, etc.).	OpEn
7	Your parental status *	Tick only one option	<ul style="list-style-type: none"> • Mother-father • Grandparents • Other:
8	Your marital status	If you do not have any particular sensitivity for this question, please answer / Tick only one option.	<ul style="list-style-type: none"> • I'm married • I divorced • My wife/husband died • I'm single (For possible family members other than parents) • Other:

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Table 27 (cont.)

9	Your education status	Tick only one option		Continue	Leave	Graduate
			Elementary education			
			Secondary education			
			Higher education			
	Other					
10	Your job *	---	OpEn			
11	Your working status *	Tick only one option	<ul style="list-style-type: none"> • I'm working full-time • I've also an additional work • I'm working part-time • I'm unemployed • I'm retired • Other: 			
12	In what range would you define your family's total monthly income?	Tick only one option	<ul style="list-style-type: none"> • 0-1000 TL • 1000-2000 TL • 2000-3000 TL • 3000 TL and above 			

Table 28. Question set of the online parent survey (Turkish)

No	Soru	Yönerge/ler	Seçenekler
Ebeveyn Soru Seti (1.-3. sorular)			
<ul style="list-style-type: none"> • Bu bölümde çocuklarımızın kişisel gelişimleri ve genel yetkinlikleri gibi konularla ilgili soruları cevaplamamız istenmektedir. • 5-14 yaş arası birden çok çocuğu olan ebeveynlere önemli not: Lütfen anketi bu yaş aralığındaki <u>en küçük çocuğunuz için</u> cevaplayınız. 			
1	Oyun, gezi, yarışma gibi fiziksel ve sosyal etkinliklere kendiliğinden ve keyif alarak katıldığımı söyleyebilir misiniz? (* Gerekli)	Yalnızca bir şıkkı işaretleyin.	Neredeyse hiç (1) 1 2 3 4 5 Her zaman (5)
2	Sizce fiziksel ve sosyal etkinliklerin çocuğunuzun tüm kişisel gelişim basamaklarını olumlu etkileme derecesi nedir? *	Yalnızca bir şıkkı işaretleyin.	En az düzeyde (1) 1 2 3 4 5 En üst düzeyde (5)
3	Yaşıtlarının kullandığı binilebilen/ sürülebilir oyuncakları/araçları vs. güvenli biçimde ve severek kullanma konusunda çocuğunuzun ilgisi ve yetkinliği nasıl? *	Yalnızca bir şıkkı işaretleyin.	Hiç yok (1) 1 2 3 4 5 En üst düzeyde (5)
Çocuğunuzun Suyla İlişkisi ve Binilebilen Su Oyuncakları (Genel) (4.-9. sorular)			
4	Deniz, göl, havuz gibi sucul ortamlarla çocuğunuzun arası nasıl? *	Yalnızca bir şıkkı işaretleyin.	Suya girmeyi hiç sevmez (1) 1 2 3 4 5 Suya girmeyi oldukça fazla sever (5)
5	Çocuğunuzun suyla ilgili OLUMLU/OLUMSUZ herhangi bir deneyimi var mı?	Suyla ilgili hiç bir deneyimi yoksa bu soruyu geçebilirsiniz / Yalnızca bir şıkkı işaretleyin.	Tamamen olumsuz (kötü/korkutucu/tehlikeli vs.) deneyimleri var (1) 1 2 3 4 5 Tamamen olumlu (iyi/neşeli/güvenli vb.) deneyimleri var (5)
6	Çocuğunuzun şimdiye kadar hiç binebileceği türden su oyuncacı oldu mu? *	Yalnızca bir şıkkı işaretleyin.	<ul style="list-style-type: none"> • Evet • Hayır

(cont. on next page)

Table 28 (cont.)

7	Çocuğunuzun binebileceği türden su oyuncakları alacak olsanız seçimi kim yapar? *	Yalnızca bir şikkı işaretleyin.	<ul style="list-style-type: none"> Seçimi sadece çocuğumuza bırakırız Seçimi ebeveyn ve parayı ödeyen olarak sadece biz yaparız Çocuğumuzla fikir alış-verişi yaparak ortak kararla seçim yaparız
8	Binilebilen su oyuncakları satın alacak olsanız İLK 5 kriteriniz hangileri olur? *	“Diğer” seçeneği de bu 5 kriterden birisi olabilir. Bu durumda ne olduğunu belirtmelisiniz / Uygun olanların tümünü işaretleyin	<ul style="list-style-type: none"> Fiyatının uygun olması Sağlam/dayanıklı olması Güvenli olması Eğlenceli olması Yararlı/geliştirici olması Tasarımının yenilikçi olması Kullanışlı olması Kullanımının kolay ve anlaşılır olması Taşıma ve saklamasının kolay olması Modüler olması Sökülüp takılabilir olması Sağlığa uygun malzemelerden üretilmesi Çok amaçlı kullanılması Rahat/konforlu olması Kaliteli malzemeden üretilmesi Diğer: ...
9	SİZCE, binilebilen su oyuncakları konusunda ÇOCUĞUNUZ İÇİN belirleyici olan ilk 5 kriter hangileri olabilir? *	“Diğer” seçeneği de bu 5 kriterden birisi olabilir. Bu durumda ne olduğunu belirtmelisiniz / Uygun olanların tümünü işaretleyin	<ul style="list-style-type: none"> Eğlendirici olması Çekici/güzel/sevimli olması Renkli olması Güven verici olması Hızlı olması Maceracı olması Sağlam/dayanıklı olması Çok amaçlı kullanılması Bireysel olması Şişme bir oyuncak olması Rahat olması Kolay taşınabilmesi Kolay kullanılabilmesi Diğer: ...
Binilebilen Şişme Su Oyuncakları (10.-14. sorular)			
10	“Şimdiye kadar aldığımız binilebilen su oyuncaklarının tamamı şişme oyuncaklardır” Bu ifadeye ne derece katılıyorsunuz? *	Yalnızca bir şikkı işaretleyin.	Hiç katılmıyorum (1) 1 2 3 4 5 Tamamen katılıyorum (5)
11	“Ebeveyn olarak çocuğumun şişme su oyuncakları kullanma deneyiminden memnunum” Bu ifadeye ne derece katılıyorsunuz? *	Yalnızca bir şikkı işaretleyin.	Hiç katılmıyorum (1) 1 2 3 4 5 Tamamen katılıyorum (5)
12	Ne sıklıkla şişme su oyuncakları alırsınız? *	Yalnızca bir şikkı işaretleyin.	<ul style="list-style-type: none"> Her yaz en az 1 kez Her yaz en çok 1 kez Kullanılmaz hale geldikçe veya kayboldukça Çocuğumuz her istediğinde Şişme su oyuncakları almayı tercih etmeyiz

(cont. on next page)

Table 28 (cont.)

13	Şişme su oyuncacı SATIN ALMANIZ İÇİN İLK 5 sebep hangileridir? *	“Diğer” seçeneği de bu 5 kriterden birisi olabilir. Bu durumda ne olduğunu belirtmelisiniz / Uygun olanların tümünü işaretleyin	<ul style="list-style-type: none">• Bir önceki kullanılmaz hale geldi ve/ya kayboldu• Çocuğumuz en çok bu tür su oyuncacını seviyor• Daha uygun fiyatlı• Daha çok çeşidi var• Kullanımı ve saklaması kolay• Daha hafif• Daha güvenli• Daha başka türde su oyuncacı bilmiyoruz• Diğer: ...
14	Şişme su oyuncaklarının yapıldığı malzemeyi çocuğunuz için sağlıklı buluyor musunuz? *	Yalnızca bir şikkı işaretleyin.	<ul style="list-style-type: none">• Evet• Hayır• Kararsızım/Bilmiyorum
Havuz Makarnaları (15.-17. sorular)			
Bu bölüm, kısaca “sosis” olarak da bilinen ve polietilen köpükten üretilen havuz (veya deniz) makarnalarının kullanımlarıyla ilgili görüşlerinizi öğrenmek için hazırlanmıştır			
15	Hiç havuz makarnası gördünüz veya kullandınız /satın aldınız mı? *	Yalnızca bir şikkı işaretleyin.	<ul style="list-style-type: none">• Sadece gördüm• Kullandım/Satın aldım• Daha önce görmedim, ne olduğunu bilmiyorum
16	Sizce havuz makarnaları ne amaçlarla kullanılır? *	“Bilmiyorum” seçeneğini seçerseniz lütfen başka seçenekleri işaretlemeyin. Ayrıca eklemek istedikleriniz varsa “Diğer” seçeneğine yazabilirsiniz. / Uygun olanların tümünü işaretleyin.	<ul style="list-style-type: none">• Yüzmeye yardımcı olarak• Suda eğlenmek için• Spor ekipmanı olarak• Basit tamiratta yalıtım malzemesi vb. olarak• Hobi projelerinde malzeme olarak• Bilmiyorum• Diğer: ...
17	Havuz makarnaları için aşağıdakilerden hangilerini söylersiniz? *	“Hiç bir fikrim yok” seçeneğini seçerseniz lütfen başka seçenekleri işaretlemeyin. Ayrıca eklemek istedikleriniz varsa “Diğer” seçeneğine yazabilirsiniz. / Uygun olanların tümünü işaretleyin.	<ul style="list-style-type: none">• Kullanışlı• Sağlam• Güvenilir• Çok amaçlı• Pratik• Uygun fiyatlı• Hiç bir fikrim yok• Diğer: ...

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Table 28 (cont.)

Haydi!!! Havuz Makarnalarından Oyuncak Yapıyor... muyuz?! (18.-20. sorular) Sizce havuz makarnaları yeni bir su oyuncuđına dönüşebilecek mi? Ne dersiniz?			
18	Sizce “KULLANIŞLI” ve “binilebilir” bir su oyuncuđı, havuz makarnaları kullanarak yapılabilir mi? *	Yalnızca bir şıkkı işaretleyin.	<ul style="list-style-type: none">• Evet• Hayır• Kararsızım/Bilmiyorum
19	Sizce “GÜVENLİ” ve “binilebilir” bir su oyuncuđı, havuz makarnaları kullanarak yapılabilir mi? *	Yalnızca bir şıkkı işaretleyin.	<ul style="list-style-type: none">• Evet• Hayır• Kararsızım/Bilmiyorum
20	Havuz makarnalarından binilebilir bir su oyuncuđı yapılacak olsa, EN ÖNEMLİ 5 özelliđi sizce neler olmalıdır? *	“Diđer” seçeneđi de bu 5 kriterden birisi olabilir. Bu durumda ne olduđunu belirtmelisiniz. / Uygun olanların tümünü işaretleyin.	<ul style="list-style-type: none">• Sağlamlık/Dayanıklılık• Yenilikçi/Özgün tasarım• Çekici görsel tasarım• Sökülüp takılabilirlik (Modüler yapı)• Kurulum ve kullanım kolaylıđı• Taşıma ve saklama kolaylıđı• Çok amaçlı kullanım• Eğitici-eđlendirici-geliştirici faydalar• Fiziksel güvenlik• Sağlık güvenliđi• Uygun fiyat• Diđer: ...
			
<p>Sizin için kısa bir video... Daha önce havuz makarnalarından yapılmış bir botun kullanım örneđi. YES Camp 2013 Noodle Canoe (https://www.youtube.com/watch?v=z_TPjLD10U acc.d.: 02.01.2020)</p>			

(cont. on next page)

Table 28 (cont.)

Son bölüm... Bitirmeye az kaldı :) (21.-25. sorular)			
<p>Bu bölümde size havuz makarnalarıyla yapılmış ve binilebilen yeni bir su oyuncuğuyla ilgili sorular sorulacaktır. Burada gördüğünüz görseller, oyuncuğun bilgisayarda modellenmiş çizimleri ve küçük boy taslak maketidir. Oyuncuğun neye benzeyeceği konusunda size fikir vermeleri amaçlanmaktadır. (Tasarım-3D CAD Modelleme-Maket Yapımı: Merter YALÇINKAYA)</p> <p style="text-align: center;">3D Sanal Model Görselleri ve Fotoğrafları ile Oyuncak Önerimizin Sunumu</p>			
			
<ul style="list-style-type: none"> • DREKAR (Ejderha)... Eski çağlarda Viking savaş gemilerine bu isim verilirdi. Ünlü “Viking Viki ve Maceraları” (Vicky The Viking) çizgi film serisi, oyuncuğumuzun karakter tasarımının esin kaynağıdır. (Tasarım-3D CAD Modelleme-Maket Yapımı: Merter YALÇINKAYA) • Bu binilebilen su oyuncuğu, kayak biçiminde oyuncak bir bot ve el çarkıyla çalıştırılan bir tür deniz bisikleti olarak tasarlanmıştır. Gövde bölümü havuz makarnalarından oluşmaktadır. Diğer bölümler için hafif ancak dayanıklı biçimde tasarlanan sert plastik kullanılması planlanmaktadır. • Oyuncuğun tam boyunun yaklaşık 212 cm uzunluğunda ve yaklaşık 150 cm yüksekliğinde olması öngörülmektedir. Ağırlık bilgisi mevcut değildir. Tüm diğer su oyuncakları gibi en az 1 yetişkin gözetiminde ve tercihen şişme yelek gibi can kurtaran ekipmanları eşliğinde kullanılmalıdır. Güvenlik açısından en çok 1 kişinin kullanımına uygundur. <p>Küçük ölçekli bu maket, fikir verici bir taslaktır. Bu nedenle ahşap, metal vida, atık CD, izolasyon bandı, tekstil ve strafor gibi son üründe kullanılması düşünülmeyen malzemelerden üretilmiştir.</p>			
21	Görsellerde maket ve 3D çizimlerini gördüğünüz ve havuz makarnalarıyla tasarlanan bu su oyuncuğunu çocuğunuza alır mısınız? *	Yalnızca bir şıkkı işaretleyin.	<ul style="list-style-type: none"> • Evet • Hayır • Kararsızım
22	Bu oyuncuğu SATIN ALMANIZI sağlayan ilk 5 kriter nelerdir? *	---	(OpEn)
23	Bu oyuncuğu SATIN ALMAMANIZI sağlayan ilk 5 kriter nelerdir? *	---	(OpEn)
24	Sizce çocuğunuzun bu oyuncuğu beğenme ve/ya isteme derecesi ne olabilir? *	Yalnızca bir şıkkı işaretleyin.	<p>Kesinlikle beğenmez/istemez (1)</p> <p>1 2 3 4 5</p> <p>Kesinlikle beğenir/ister (5)</p>
25	Sizce bu oyuncak için fiyat aralığı ne olabilir? *	Yalnızca bir şıkkı işaretleyin.	<ul style="list-style-type: none"> • 1-100 TL • 100-200 TL • 200-300 TL • 300-400 TL • 400-500 TL • 500 TL ve üzeri
Onay Sorusu			
26	SON olarak, tüm soruları dikkatle okuyup cevapladığınızı onaylamak için (B) şıkkını işaretler misiniz? *	Yalnızca bir şıkkı işaretleyin.	<p>A) Anketi cevaplarırken çok eğlendim</p> <p>B) Çok uzun ve sıkıcı bir anketti</p>
Anketi Tamamladınız, Tebrikler ve Teşekkürler !!!			
<p>Anket cevaplamak çoğu kimse için genellikle sıkıcı bir iştir. Ancak yine de değerli zamanınızı ayırıp, özveriyle anketime katıldığınız ve araştırmama önemli bir katkı sağladığınız için çok teşekkür ederim...</p>			

Table 29. Question set of the online parent survey (English)

No	Question	Instruction/s	Options
Parent Question Set (1st-3rd questions)			
<ul style="list-style-type: none"> In this section, you are asked to answer questions about your children's personal development and general competencies. Important note to parents of multiple children aged 5-14: Please answer the survey for your <u>youngest child</u> in this age range. 			
1	Can you say that your child participates in physical and social activities such as games, trips and competitions spontaneously and with pleasure? (* Necessary)	Tick only one option	Almost never (1) 1 2 3 4 5 Every time (5)
2	In your opinion, what is the extent to which physical and social activities positively affect all personal development steps of your child? *	Tick only one option	At the minimum level (1) 1 2 3 4 5 At the maximum level (5)
3	How is your child's interest and competence in using the rideable toys/vehicles etc. used by her/his peers safely and fondly? *	Tick only one option	No interest/competence (1) 1 2 3 4 5 At the maximum level (5)
Your Child's Relationship with Water and Rideable Aquatic Toys (General) (4th-9th questions)			
4	How is your child's relationship with aquatic environments such as the sea, lake, pool? *	Tick only one option	S/he never likes to go into the water (1) 1 2 3 4 5 S/he loves to go into the water a lot (5)
5	Does your child have any POSITIVE/NEGATIVE experiences with water?	If s/he have no experience with water, you can skip this question./ Tick only one option	Totally negative experiences (bad/scary/dangerous etc.) (1) 1 2 3 4 5 Totally positive experiences (good/cheerful/safe etc.) (5)
6	Has your child ever had the rideable aquatic toy? *	Tick only one option	<ul style="list-style-type: none"> Yes No
7	If you were to buy aquatic toys that your child could ride on, who would make the choice? *	Tick only one option	<ul style="list-style-type: none"> We leave the choice only to our child Only we make the choice, as the parent and payer We make choices with our child by exchanging ideas
8	If you were to buy rideable aquatic toys, what would your TOP 5 criteria be? *	The "Other" option can also be one of these 5 criteria. In this case you must specify them / Tick all that apply	<ul style="list-style-type: none"> Affordable price Its being robust/durable Its being safe/reliable Its being entertaining Its being beneficial/ developer Innovative design Its being useful Ease of use/intelligibility of use Ease of carriage/storage Modularity Its being mountable Its being made of materials suitable for health Multipurpose use Its being comfortable Its being made of quality materials Other: ...

(cont. on next page)

Table 29 (cont.)

9	What do you think are the 5 most important criteria for your child about rideable aquatic toys? *	The “Other” option can also be one of these 5 criteria. In this case you must specify them / Tick all that apply	<ul style="list-style-type: none"> • Its being entertaining • Its being attractive/beautiful /lovely • Its being colorful • Its being safe/reliable • Its being fast • Its being adventurous • Its being robust/durable • Multipurpose use • Its being for one person • Its being inflatable • Its being comfortable • Ease of carriage • Ease of use • Other: ...
Rideable Inflatable Aquatic Toys (10th-14th questions)			
10	<u>“All the rideable aquatic toys we have bought so far are inflatable toys”</u> To what extent do you agree with this statement? *	Tick only one option	I don’t agree at all (1) 1 2 3 4 5 I totally agree (5)
11	<u>“As a parent, I’m satisfied with my child’s experience of using inflatable aquatic toys”</u> To what extent do you agree with this statement? *	Tick only one option	I totally disagree (1) 1 2 3 4 5 I totally agree (5)
12	How often do you buy inflatable aquatic toys? *	Tick only one option	<ul style="list-style-type: none"> • Every summer, at least once • Every summer, at most once • As it becomes unusable or lost • Whenever our child wants • We don’t prefer to buy inflatable aquatic toys
13	What are your TOP 5 reasons to buy inflatable aquatic toys? *	The “Other” option can also be one of these 5 criteria. In this case you must specify them / Tick all that apply	<ul style="list-style-type: none"> • The previous one has become unusable and/or lost • Our child likes this kind of aquatic toy the most • More affordable • There are more varieties • Easy to use and store • More lighter • More safer • We don’t know any other types of aquatic toys • Other: ...
14	Do you find the material of inflatable aquatic toys healthy for your child? *	Tick only one option	<ul style="list-style-type: none"> • Yes • No • I’m undecided/I don’t know
Pool Noodles (15th-17th questions)			
This section has been prepared to get your views on the uses of pool (or sea) noodles, also known as “sausage” and made of polyethylene foam.			
15	Have you ever seen or used/bought pool noodles? *	Tick only one option	<ul style="list-style-type: none"> • I’ve only seen • I used/bought • I’ve never seen, I don’t know what it is

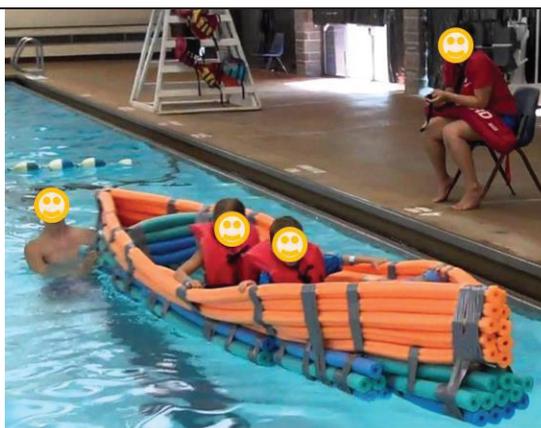
(cont. on next page)

Table 29 (cont.)

16	What do you think pool noodles are used for? *	If you choose the “I don’t know” option, please do not tick any other options. Also, if you have anything you want to add, you can write it in the “Other” option. / Tick all that apply	<ul style="list-style-type: none"> • As an aid to swimming • To have fun in the water • As a sport equipment • As an insulation material etc. in simple repairs • As a hobby material • I don’t know • Other: ...
17	Which of the following would you say about pool noodles? *	If you choose the “I’ve no idea” option, please do not tick any other options. Also, if you have anything you want to add, you can write it in the “Other” option. / Tick all that apply	<ul style="list-style-type: none"> • Useful • Durable • Safe • Multipurpose • Practical • Affordable • I’ve no idea • Other: ...
<p>Lets!!! Are We Making Toys From Pool Noodles?! (18th-20th questions) Do you think pool noodles can turn into a new aquatic toy? What about?</p>			
18	Do you think a “useful” and “rideable” aquatic toy can be made using pool noodles? *	Tick only one option	<ul style="list-style-type: none"> • Yes • No • I’m undecided/I don’t know
19	Do you think a “safe” and “rideable” aquatic toy can be made using pool noodles? *	Tick only one option	<ul style="list-style-type: none"> • Yes • No • I’m undecided/I don’t know
20	If a rideable aquatic toy is to be made from pool noodles, what do you think should be the 5 MOST IMPORTANT features? *	The “Other” option can also be one of these 5 criteria. In this case you must specify them / Tick all that apply	<ul style="list-style-type: none"> • Robustness/durability • Innovative/original design • Attractive visual design • Demountability (modular structure) • Ease of installation and use • Ease of carriage and storage • Multipurpose use • Educational-entertaining-developing benefits • Physical safety • Health safety • Reasonable price • Other: ...

(cont. on next page)

Table 29 (cont.)



A short video show for you... Example of use of a boat that was previously made from pool noodles. YES Camp 2013 Noodle Canoe (https://www.youtube.com/watch?v=z_TPjLD10U acc.d.: 02.01.2020)

Last section... Almost finished :) (21th-25th questions)

In this section you will be asked questions about a new rideable aquatic toy made from pool noodles. The images you see here are computer-modeled drawings of the toy and photos of its small-size sketch model. They are intended to give you an idea of what the toy will look like. (Design-3D CAD Modeling-Model Making: Merter YALÇINKAYA)

Presentation of Our Toy Proposal with 3D Virtual Model Images & Photos



- DREKAR (Dragon)... This was the name given to Viking warships in ancient times. The famous cartoon series, “Vicky The Viking”, is the inspiration for the character design of our toy. (Design-3D CAD Modeling-Model Making: Merter YALÇINKAYA)
- This rideable aquatic toy is designed as a toy boat in the shape of a dinghy and a kind of handwheel operated sea bike. The hull part consists of pool noodles. For other sections, it is planned to use rigid plastic, which is designed to be lightweight but durable.
- It is envisaged that the length of the toy is approximately 212 cm and the height is approximately 150 cm. Weight information is not yet available. Like all other aquatic toys, it should be used under the supervision of at least 1 adult and preferably accompanied by lifesaving equipment such as inflatable vests. In terms of safety, it is suitable for use by 1 person at most.

This small scale model is an inspiring sketch. For this reason it has made from materials not intended for use in the final product, such as wood, metal screws, waste CDs, insulation tape, textiles, and styrofoam.

21	Would you buy this aquatic toy designed with pool noodles, which you see in the images and 3D drawings, for your child? *	Tick only one option	<ul style="list-style-type: none"> • Yes • No • I'm undecided
22	What are the top 5 criteria that will make you buy this toy? *	---	(OpEn)
23	What are the top 5 criteria that will prevent you from buying this toy? *	---	(OpEn)

(cont. on next page)

Table 29 (cont.)

24	What do you think the degree to which your child likes and/or wants this toy? *	Tick only one option	S/he definitely will not like/want (1) 1 2 3 4 5 S/he will definitely love/want (5)
25	What do you think the price range for this toy would be? *	Tick only one option	<ul style="list-style-type: none"> • 1-100 TL • 100-200 TL • 200-300 TL • 300-400 TL • 400-500 TL • 500 TL and above
Confirmative Question			
26	FINALLY, could you tick option (B) to confirm that you have carefully read and answered all questions? *	Tick only one option	A) I had a lot of fun answering the survey B) It was very long and boring.
<p>You Completed the Survey, Congratulations and Thank you!!!</p> <p>Answering surveys is often a tedious task for most people. However, I would like to thank you very much for taking your valuable time, taking part in my survey and making an important contribution to my research.</p>			

APPENDIX C

ONLINE EXPERT SURVEY

Uzmanlar İin Acık Uçlu Grüşme Soruları	
<p>Bu alıřma, genelden zele bir akıřla, binilebilir/tařıyıcı nitelikteki su oyuncaklarının ocuk geliřimine olası etkilerinin uzman grüşü ile deęerlendirilmesi amacıyla hazırlanmıřtır.</p> <p>İlk 3-4 soru, katılımcıların kendilerini tanıtmaları ve daha genel olarak oyun-oyuncak kavramlarının pedagoji ve eęitim bilimleri alanında neler ifade ettięine dair grüşlerinin alınmasıyla başlamaktadır. Bu blümün son soruları, esas arařtırma konusuna birer giriř/hazırlık niteliğindedir. Bundan sonraki blümde ise, 3D CAD izimleri ve <u>küçük boy taslak maketinin</u> sunumuyla tez alıřmasının rnekleneceęi oyuncak tasarımının katılımcılara tanıtılmasını amaçlanmaktadır (<u>Size tanıtılan rnekler son ürün deęildir, konu hakkında fikir verici olmaları amaçlanmıřtır</u>).</p> <p>Elde edilen veriler, Merter Yalçınkaya'nın hazırladıęı "Sucul Oyuncak Tasarımında Polietilen Havuz Makarnalarının Alternatif Kullanımı İin Bir Oyuncak Önerisi" isimli yüksek lisans tezinde deęerlendirilecektir. Pandemi kořulları nedeniyle yüz yüze grüşme seeneęi mümkün olmadığından, bu yolla yardımınıza bař vurulmuřtur. Tez alıřmamda önemli bir yer tutacak olan bu arařtırmaya yapacaęımız deęerli katkılarınız için şimdiden ok teřekkür ederim.</p> <p>* Gerekli</p>	

Figure 45. Introductory text of the online expert survey (Turkish)

Table 30. Question set of the online expert survey (Turkish)

No	Soru
1	Kısaca kendinizi tanıtır mısınız? (...)
2	Literatürden bilindięi üzere, "oyun" ve "oyuncak", ocuk geliřimi ve eęitiminde sıkça üstünde durulan kavramlar. Uzman bakıř aısıyla, oyun ve oyuncakın size neyi ifade ettięini zetler misiniz?
3	Sizce "oyuncaklar" ve "oyun malzemeleri" (veya araları), TEKNİK ve/ya PRATİK anlamda birbirinden ayrı ele alınması gereken kavramlar mı? Bu anlamda bir ayırım yapmayı gerekli ve/ya mantıklı buluyor musunuz? Nedenleriyle aıklar mısınız?
4	Deniz/göl/havuz vb. sucul ortamların ocuk geliřiminde herhangi bir katkısından söz edilebilir mi? Eęer varsa, bu ne gibi etkileşimlerle, hangi geliřim alanlarında olmaktadır? Aıklar mısınız?
5	Binilebilen veya tařıma işlevi olan sucul ortam oyuncakları deyince ilk aklınıza gelen eřitler aęırlıklı olarak ne türden oyuncaklardır? Bunlara alternatif eřitler olabilir mi? rnekler misiniz?
6	Binilebilen veya tařıma işlevi olan sucul ortam oyuncaklarından herhangi bir pedagojik fayda saęlamak mümkün müdür? Sizce bu tür oyuncakların kullanımı için ocuk kullanıcıların ne gibi yeterliklere sahip olmaları gerekir?
7	Havuz makarnaları (deniz makarnası, yüzme makarnası, sosis gibi adlarla da bilinir) konusunda bireysel ve/ya mesleki anlamda bilginiz, herhangi bir kullanım deneyiminiz var mı? Havuz makarnalarının daha bařka kullanım alanları olabilir mi?

(cont. on next page)

Table 30 (cont.)

Tanıttıcı Bölüm	
<p>Vicky The Viking: Vicky ve arkadaşlarının maceraları...</p>  <p>Chibihiro Viking Vicky / Wickett sind die stolzen Mörner © Fuji TV / Trause et Zuyd End</p>	
 <p>http://youtube.com/watch?v=o4cu9-1ciPE</p>	
<p>Vicky The Viking (tanıttıcı illüstrasyon) https://i.pinimg.com/originals/11/8a/c4/118ac4876a68b6ad1d9d7afb6088e124.jpg acc.d.: 23.06.2020 Vicky The Viking (kısa video) http://youtube.com/watch?v=o4cu9-1ciPE acc.d.: 23.06.2020</p>	
3D Sanal Model Görseleleri ve Fotoğrafları ile Oyuncak Önerimizin Sunumu	
 	
<ul style="list-style-type: none">• DREKAR (Ejderha)... Eski çağlarda Viking savaş gemilerine bu isim verilirdi. Ünlü “Viking Viki ve Maceraları” (Vicky The Viking) çizgi film serisi, oyuncuğımızın karakter tasarımının esin kaynağıdır. (Tasarım-3D CAD Modelleme-Maket Yapımı: Merter YALÇINKAYA)• Bu binilebilen su oyuncuğı, kayak biçiminde oyuncak bir bot ve el çarkıyla çalıştırılan bir tür deniz bisikleti olarak tasarlanmıştır. Gövde bölümü havuz makarnalarından oluşmaktadır. Diğer bölümler için hafif ancak dayanıklı biçimde tasarlanan sert plastik kullanılması planlanmaktadır.• Oyuncuğın tam boyunun yaklaşık 212cm uzunluğunda ve yaklaşık 150 cm yüksekliğinde olması öngörülmektedir. Ağırlık bilgisi mevcut değildir. Tüm diğer su oyuncakları gibi en az 1 yetişkin gözetiminde ve tercihen şişme yelek gibi can kurtaran ekipmanları eşliğinde kullanılmalıdır. Güvenlik açısından en çok 1 kişinin kullanımına uygundur.• KÜÇÜK ÖLÇEKLİ BU MAKET, FİKİR VERİCİ BİR TASLAKTIR. Bu nedenle ahşap, metal vida, atık CD, izolasyon bandı, tekstil ve strafor gibi son üründe kullanılması düşünülmemen malzemelerden üretilmiştir.	

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Table 30 (cont.)

8	Sizece bu tasarımın hedef kitlesi kaç yaş aralığı olmalı? Çocukların gelişim kategorileri (fiziksel-bilişsel vb.) üzerinden ve nedenleriyle ve/ya örneklerle açıklar mısınız?
9	Size tanıtılan bu oyuncak önerisinin pedagojik anlamda gelişime katkı sağlama potansiyelini değerlendirir misiniz?
10	Bu oyuncakçı SADECE SÖZCÜK KULLANARAK nitelemeniz istense hangi sözcükleri kullanırdınız? Başka bir deyişle, bu oyuncakın sizde uyandırdığı çağrışımları belirten anahtar kelimeler neler olur?
11	Tasarımın beğendiğiniz-beğenmediğiniz veya gözden kaçtığını düşündüğünüz yönlerini açıklar mısınız? (Görsellerde size sunulan maket demo malzemelerden yapılmış fikir verici bir taslaktır. Son ürün değildir.)
12	Oyuncağa uygulanan karakter tasarımıyla ilgili görüşleriniz nelerdir? Bu anlamda, çizgi kahramanlar vb. öğelerin çocuklar için üretilen ürünlerin görsel tasarımlarında kullanılması olgusunu nasıl değerlendirirsiniz?
13	Son olarak eklemek istedikleriniz, gözden kaçtığını düşündüğünüz önemli konular nelerdir?
Değerli zamanınızdan fedakârlık edip araştırmama bulunduğunuz önemli katkıdan dolayı çok teşekkür ederim.	

Table 31. Question set of the online expert survey (English)

No	Question
1	Could you briefly introduce yourself? (...)
2	As it is known from the literature, “play” and “toy” are concepts that are frequently emphasized in child development and education. Can you summarize what the play and the toy mean to you from an expert point of view?
3	Do you think “toys” and “play materials” (or tools) are concepts that should be treated separately from each other in a TECHNICAL and/or PRACTICAL sense? Do you find it necessary and/or logical to make a distinction in this sense? Can you explain with reasons?
4	Is it possible to talk about any contribution of aquatic environments such as sea/lake/pool etc. to child development? If so, with what interactions, in what developmental areas? Can you explain?
5	When you think of aquatic environment toys that can be rideable or carrier, what kind of toys do you think of first? Are there alternatives to these? Can you give examples?
6	Is it possible to derive any pedagogical benefit from the rideable or carrier aquatic toys? What qualifications do you think child users should have for the use of such toys?
7	Do you have any personal and/or professional knowledge and experience of using pool noodles (also known as sea noodles, swimming noodles, sausages)? Could pool noodles have other uses?
Introductory part	
Vicky The Viking: Vicky ve arkadaşlarının maceraları...	
	
	
http://youtube.com/watch?v=o4cu9-1ciPE	
Vicky The Viking (introductory illustration) https://i.pinimg.com/originals/11/8a/c4/118ac4876a68b6ad1d9d7afb6088e124.jpg acc.d.: 23.06.2020	
Vicky The Viking (a short video) http://youtube.com/watch?v=o4cu9-1ciPE acc.d.: 23.06.2020	

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Table 31 (cont.)

Presentation of Our Toy Proposal with 3D Virtual Model Images & Photos



- DREKAR (Dragon)... This was the name given to Viking warships in ancient times. The famous cartoon series, “Vicky The Viking”, is the inspiration for the character design of our toy. (Design-3D CAD Modeling-Model Making: Merter YALÇINKAYA)
- This rideable aquatic toy is designed as a toy boat in the shape of a dinghy and a kind of handwheel operated sea bike. The hull part consists of pool noodles. For other sections, it is planned to use rigid plastic, which is designed to be lightweight but durable.
- It is envisaged that the length of the toy is approximately 212 cm and the height is approximately 150 cm. Weight information is not yet available. Like all other aquatic toys, it should be used under the supervision of at least 1 adult and preferably accompanied by lifesaving equipment such as inflatable vests. In terms of safety, it is suitable for use by 1 person at most.
- THIS SMALL SCALE MODEL IS AN INSPIRING SKETCH. For this reason it has made from materials not intended for use in the final product, such as wood, metal screws, waste CDs, insulation tape, textiles, and styrofoam.

8	What age range do you think the target audience of this design should be? Can you explain the reasons and/or examples in terms of children’s development categories (physical-cognitive etc.)?
9	Could you evaluate the potential of this toy proposal introduced to you to contribute to pedagogical development?
10	If you were asked to describe this toy USING ONLY WORDS, what words would you use? In other words, what are the keywords that indicate the associations that this toy evokes in you?
11	Can you explain the aspects of the design that you like or dislike or think overlooked? (The model presented to you in the images is an informative sketch made of demo materials. It is not a final product.)
12	What are your views on the character design applied to the toy? In this sense, how would you evaluate the use of cartoon characters etc. in the visual designs of products produced for children?
13	Finally, what do you want to add, what are the important issues that you think have been overlooked?
Thank you very much for your valuable time and valuable contribution to my research.	

APPENDIX D

TRANSCRIPTS OF THE ONLINE EXPERT SURVEY (TURKISH)

Transcript 1:

1st Expert: Woman, 42 years old

1. Kısaca kendinizi tanıtır mısınız? (...)

(...) Psikoloji Bölümü mezunuyum. Yaklaşık 20 yıldır Anaokulu Yöneticisi ve Psikoloğuyum. Uzmanlık alanım 3-6 yaş çocuklarının gelişimi yani okul öncesi çocuklardır.

2. Literatürden bilindiği üzere, “oyun” ve “oyuncak”, çocuk gelişimi ve eğitiminde sıkça üstünde durulan kavramlar. Uzman bakış açısıyla, oyun ve oyuncakın size neyi ifade ettiğini özetler misiniz?

Bu soruyu cevaplamaya çok sevdiğim bir sözle başlamak isterim: “Kuşlar Uçar, Balıklar Yüzer, Yetişkinler Konuşur, Çocuklar Oyun Oynar.” (Garry Landreth) Okul öncesinde çocuğu öğrenmeye, keşfetmeye, anlamaya yönlendiren en başlıca etmen oyun ve oyuncaklardır. Oyun oynamak, çocuğun gelişimi için yaşamsal bir önem taşımaktadır. Çocuğun gözü ile bakıldığında oyun, çocuğun en önemli işi, oyuncakları da en önemli aracıdır. Oyuncaklar, çocuğun seçme, değerlendirme duygusunu ve yaratıcılığını geliştirirken aynı zamanda da kendi kendine karar verebilme ve belirli alanlarda beceriler kazanmasına da olanaklar hazırlamaktadır. Bu durumda bizler oyuncakları, “gelişim basamakları boyunca çocuğun hareketlerine düzen getiren zihinsel, bedensel ve psiko-sosyal gelişimlerinde yardımcı olan hayal gücünü ve yaratıcı yeteneklerini geliştiren tüm oyun malzemeleridir” şeklinde tanımlayabiliriz.

3. Sizce “oyuncaklar” ve “oyun malzemeleri” (veya araçları), TEKNİK ve/ya PRATİK anlamda birbirinden ayrı ele alınması gereken kavramlar mı? Bu anlamda bir ayrım yapmayı gerekli ve/ya mantıklı buluyor musunuz? Nedenleriyle açıklar mısınız?

Biz gelişim psikologları oyuncakları, “gelişim basamakları boyunca çocuğun hareketlerine düzen getiren zihinsel, bedensel ve psiko-sosyal gelişimlerinde yardımcı olan hayal gücünü ve yaratıcı yeteneklerini geliştiren tüm oyun malzemeleridir” şeklinde tanımlıyoruz. Bu noktadan yola çıktığımızda çocuğun yaratıcılığını desteklemek noktasında ve işlevselliği düşünüldüğünde ben iki kavramın birbirinden çok fazla ayrılabilceğini düşünmüyorum. Hatta birbirleriyle çok iç içe iki kavram oldukları için bunun çok mümkün olabileceğini düşünmüyorum.

4. Deniz/göl/havuz vb. sucul ortamların çocuk gelişiminde herhangi bir katkısından söz edilebilir mi? Eğer varsa, bu ne gibi etkileşimlerle, hangi gelişim alanlarında olmaktadır? Açıklar mısınız?

Çocuklar küçük yaşlardan itibaren su ile oynamayı çok severler. Sulu ortamlarda bulunmak en önemlisi çocuklara bir rahatlama yolu sağlaması sayesinde çocukların

sosyal-duygusal alanlarını desteklemektedir. Bunun yanısıra deniz kenarında su ve kum oyuncakları ile diğer çocuklarla sosyalleşmiş paylaşmayı da öğrenirler. Ayrıca denizin içerisinde deniz oyuncaklarını kullanarak el-ayak ve bedensel koordinasyonlarını da geliştirirler. Yüzme öğrenirken kullandıkları kolluklar sayesinde su üstünde durma konusunda deneyim sahibi olup ilerideki yüzme becerileri konusunda özgüvenlerini geliştirmiş olurlar.

5. Binilebilen veya taşıma işlevi olan sucul ortam oyuncakları deyince ilk aklınıza gelen çeşitler ağırlıklı olarak ne türden oyuncaklardır? Bunlara alternatif çeşitler olabilir mi? Örnekler misiniz?

İlk aklıma gelenler çocuk simitleri, kolluklar, sosisler,deniz yatağı ve kano ve deniz bisikletleri gibi oyuncaklar... Alternatif olarak açıkçası aklıma bir şey gelmiyor.

6. Binilebilen veya taşıma işlevi olan sucul ortam oyuncaklarından herhangi bir pedagojik fayda sağlamak mümkün müdür? Sizce bu tür oyuncakların kullanımı için çocuk kullanıcıların ne gibi yeterliklere sahip olmaları gerekir?

Binilebilen sucul ortam oyuncakları daha öncede belirttiğim üzere gelişimsel anlamda çocuklara birçok yönüyle fayda sağlayabilir. Örneğin üzerinde dengede durmak zorunda olması itibariyle çocuklar denge ve koordinasyon becerisini aynı zamanda problem çözme becerisini de geliştirebilir. Bunun yanısıra özellikle iki kişi binilen kano ve türevi oyuncaklarda işbirliği ve takım oyunculuğu gibi becerileri de destekleyebilir. Bence yüzme becerisine sahip olmaları ya da su üzerinde durmayı başarabilecek yeterlilikte olmaları tercih edilmelidir.

7. Havuz makarnaları (deniz makarnası, yüzme makarnası, sosis gibi adlarla da bilinir) konusunda bireysel ve/ya mesleki anlamda bilginiz, herhangi bir kullanım deneyiminiz var mı? Havuz makarnalarının daha başka kullanım alanları olabilir mi?

Okul öğrencilerimizle birlikte yüzme dersi alırlarken onların sosisleri kullanmalarını gözlemleme şansım oldu. Yüzme öğrenirken çocukların özgüvenlerini desteklemek noktasında çocukların özgüvenlerini artırıcı bir rolü vardı. Havuz makarnalarını biz anaokulunda güvenlik için kapılarda kullanabiliyorduk ayrıca oyuncak at yaparak yaratıcılıklarına destek oluyorduk.

8. Sizce bu tasarımın hedef kitlesi kaç yaş aralığı olmalı? Çocukların gelişim kategorileri (fiziksel-bilişsel vb.) üzerinden ve nedenleriyle ve/ya örneklerle açıklar mısınız?

5-14 yaş aralığı olduğunu düşünüyorum. Çocukların kendi bedensel kontrollerini ve el-ayak koordinasyonlarını daha iyi sağlayabilmeleri, problem çözebilme becerileri ve yüzme kabiliyetleri açısından 5 yaş ve üzerinde olmalarının gerekli olduğunu düşünüyorum.

9. Size tanıtılan bu oyuncak önerisinin pedagojik anlamda gelişime katkı sağlama potansiyelini değerlendirir misiniz?

Görünüşü itibariyle çocukların ilgisini çekebileceğini düşünüyorum. Ayrıca suyun üzerinde olma fikri çocuklar için her zaman cezbedicidir. Gelişimsel anlamda eğlence ve keşif öğelerini içermesi de çocukların onunla oynama isteğini artıracaktır.

10. Bu oyuncuđı SADECE SÖZCÜK KULLANARAK nitelemeniz istense hangi sözcükleri kullanırdınız? Başka bir deyişle, bu oyuncuđın sizde uyandırdığı çağrışımları belirten anahtar kelimeler neler olur?

Macera, keşif, uzak ufuklar

11. Tasarımın beğendiğiniz-beğenmediğiniz veya gözden kaçırdığını düşündüğünüz yönlerini açıklar mısınız? (Görsellerde size sunulan maket demo malzemelerden yapılmış fikir verici bir taslaktır. Son ürün değildir.)

Çocukların dikkatini çekme açısından Viking karakterinin kullanılması bence güzel fikir...Öte yandan yetişkin gözetiminin gerekli olduğu düşünöldüğünde buna yardımcı olabilecek aparatlar eklenebilir. Örneğın çekme için tutma yerleri yada plastik el kayışları gibi.

12. Oyuncuđa uygulanan karakter tasarımıyla ilgili görüşleriniz nelerdir? Bu anlamda, çizgi kahramanlar vb. öğelerin çocuklar için üretilen ürünlerin görsel tasarımlarında kullanılması olgusunu nasıl değerlendirirsiniz?

Daha öncede belirttiğim gibi kullanılmış olan Viking öğesi macera ve keşif olgusunu desteklemek anlamında güzel çağrışımlarda bulunuyor. Çocukların bir oyuncakla oynamasını daha doğrusu tercih etmesini sağlamak açısından çizgi kahramanların (eğer doğru amaçlar için kullanılıyorsa) kullanılmasını olumlu buluyorum.

13. Son olarak eklemek istedikleriniz, gözden kaçırdığını düşündüğünüz önemli konular nelerdir?

Başarılar dilerim.

Transcript 2:

2nd Expert: Woman, 35 years old

1. Kısaca kendinizi tanıtır mısınız? (...)

Fen faköltesi biyoloji bölümü mezunuyum. (...) Eğitim programları tezli yüksek lisansımı tamamladım. Online eğitim danışmanlık firmasında eğitim koordinatörü olarak çalışmaktayım.

2. Literatürden bilindiğı üzere, “oyun” ve “oyuncak”, çocuk gelişimi ve eğitiminde sıkça üstünde durulan kavramlar. Uzman bakış açısıyla, oyun ve oyuncuđın size neyi ifade ettiğini özetler misiniz?

Oyun: Çocuğın kendi kurguladığı , duygu ve düşüncelerini yansıttığı bir alan. Oyuncak ise bunları sağlayan araçlardır.

3. Sizce “oyuncaklar” ve “oyun malzemeleri” (veya araçları), TEKNİK ve/ya PRATİK anlamda birbirinden ayrı ele alınması gereken kavramlar mı? Bu anlamda bir ayrım yapmayı gerekli ve/ya mantıklı buluyor musunuz? Nedenleriyle açıklar mısınız?

Bence ayrı ele alınması gerekmez.

4. Deniz/göl/havuz vb. sucul ortamların çocuk gelişiminde herhangi bir katkısından söz edilebilir mi? Eğer varsa, bu ne gibi etkileşimlerle, hangi gelişim alanlarında olmaktadır? Açıklar mısınız?

Sulu ortamlar çocukların fiziksel, bilişsel olarak olarak gelişimlerine olumlu katkı sağlamaktadır.

5. Binilebilen veya taşıma işlevi olan sucul ortam oyuncakları deyince ilk aklınıza gelen çeşitler ağırlıklı olarak ne türden oyuncaklardır? Bunlara alternatif çeşitler olabilir mi? Örnekler misiniz?

Hiçbir fikrim yok.

6. Binilebilen veya taşıma işlevi olan sucul ortam oyuncaklarından herhangi bir pedagojik fayda sağlamak mümkün müdür? Sizce bu tür oyuncakların kullanımı için çocuk kullanıcıların ne gibi yeterliklere sahip olmaları gerekir?

Mutlaka faydası olur. Taşıma ve binme, dengede durma, kendine güven, yapabilme algısı, bedensel güç ve fiziksel kuvvet alanlarında gelişimine katkı sunar.

7. Havuz makarnaları (deniz makarnası, yüzme makarnası, sosis gibi adlarla da bilinir) konusunda bireysel ve/ya mesleki anlamda bilginiz, herhangi bir kullanım deneyiminiz var mı? Havuz makarnalarının daha başka kullanım alanları olabilir mi?

Hiçbir bilgim yok.

8. Sizce bu tasarımın hedef kitlesi kaç yaş aralığı olmalı? Çocukların gelişim kategorileri (fiziksel-bilişsel vb.) üzerinden ve nedenleriyle ve/ya örneklerle açıklar mısınız?

İlköğretim yaş gurubu olmalıdır.

9. Size tanıtılan bu oyuncak önerisinin pedagojik anlamda gelişime katkı sağlama potansiyelini değerlendirir misiniz?

Bu konuda detaylı bilgim olmadığından, bilmiyorum.

10. Bu oyuncak SADECE SÖZCÜK KULLANARAK nitelemeniz istense hangi sözcükleri kullanırdınız? Başka bir deyişle, bu oyuncakın sizde uyandırdığı çağrışımları belirten anahtar kelimeler neler olur?

Renkli, pratik, küçük yaş grubu, tek kişilik

11. Tasarımın beğendiğiniz-beğenmediğiniz veya gözden kaçtığını düşündüğünüz yönlerini açıklar mısınız? (Görsellerde size sunulan maket demo malzemelerden yapılmış fikir verici bir taslaktır. Son ürün değildir.)

Çocukların dikkatini ve ilgisini çekecek bir tasarım olduğunu düşünüyorum Ancak suda çocuğun güvenli olarak yetişkin desteğine ihtiyaç duymadan kullanabileceği konusunda emin olamadım.

12. Oyuncakta uygulanan karakter tasarımıyla ilgili görüşleriniz nelerdir? Bu anlamda, çizgi kahramanlar vb. öğelerin çocuklar için üretilen ürünlerin görsel tasarımlarında kullanılması olgusunu nasıl değerlendirirsiniz?

13. Son olarak eklemek istedikleriniz, gözden kaçtığını düşündüğünüz önemli konular nelerdir?

Transcript 3:

3rd Expert: Woman, 36 years old

1. Kısaca kendinizi tanıtır mısınız? (...)

(...) Okul öncesi öğretmenliği/Okul öncesi öğretmeni

2. Literatürden bilindiği üzere, “oyun” ve “oyuncak”, çocuk gelişimi ve eğitiminde sıkça üstünde durulan kavramlar. Uzman bakış açısıyla, oyun ve oyuncakın size neyi ifade ettiğini özetler misiniz?

Oyun çocuğun her alanda kendini ifade edebilme şeklidir. Oyuncak, keşfetmesinde bir araçtır.

3. Sizce “oyuncaklar” ve “oyun malzemeleri” (veya araçları), TEKNİK ve/ya PRATİK anlamda birbirinden ayrı ele alınması gereken kavramlar mı? Bu anlamda bir ayrım yapmayı gerekli ve/ya mantıklı buluyor musunuz? Nedenleriyle açıklar mısınız?

Hayır ayrı ele alınmamalıdır. Aynı amacı güden oyuncak ve oyun malzemelerinin ayrı ele alınmasına gerek yoktur.

4. Deniz/göl/havuz vb. sucul ortamların çocuk gelişiminde herhangi bir katkısından söz edilebilir mi? Eğer varsa, bu ne gibi etkileşimlerle, hangi gelişim alanlarında olmaktadır? Açıklar mısınız?

Tabi ki katkıları vardır. Özellikle duyuusal ve psiko-motor becerilerinin geliştirilmesinde oldukça etkilidir. Çocuklar genelde bu tür etkinliklere keyifle katılırlar.

5. Binilebilen veya taşıma işlevi olan sucul ortam oyuncakları deyince ilk aklınıza gelen çeşitler ağırlıklı olarak ne türden oyuncaklardır? Bunlara alternatif çeşitler olabilir mi? Örnekler misiniz?

Şişme su oyuncakları, deniz bisikleti, makarna gibi oyuncaklar. Çeşitlendirilebilir ancak çocukların daha aktif olarak katılabileceği oyuncaklar olmalı diye düşünüyorum.

6. Binilebilen veya taşıma işlevi olan sucul ortam oyuncaklarından herhangi bir pedagojik fayda sağlamak mümkün müdür? Sizce bu tür oyuncakların kullanımı için çocuk kullanıcıların ne gibi yeterliklere sahip olmaları gerekir?

Psiko-motor becerilerine çok katkısı olabileceğini düşünüyorum. Başarma hissi yaratarak özgüvenlerine katkı sağlayabilir. Bu konuda yeterlilikleri olması gerektiğini düşünüyorum. Önemli olan oyuncakla tanıştırılması ve seyerek yapmasıdır.

7. Havuz makarnaları (deniz makarnası, yüzme makarnası, sosis gibi adlarla da bilinir) konusunda bireysel ve/ya mesleki anlamda bilginiz, herhangi bir kullanım deneyiminiz var mı? Havuz makarnalarının daha başka kullanım alanları olabilir mi?

Evet bilgim var ancak kullanmadım. Olabilir ama bir bilgim yok.

8. Sizce bu tasarımın hedef kitlesi kaç yaş aralığı olmalı? Çocukların gelişim kategorileri (fiziksel-bilişsel vb.) üzerinden ve nedenleriyle ve/ya örneklerle açıklar mısınız?

Gerekli önlemler alınarak 3-8 yaş aralığına uygun olabilir. 3 yaş altı çocukların fiziksel ve bilişsel anlamda yeterli düzeyde olmayacağını, 8 yaş üzeri çocukların ise ilgi çekici bulmayacağını düşünüyorum.

9. Size tanıtılan bu oyuncak önerisinin pedagojik anlamda gelişime katkı sağlama potansiyelini değerlendirir misiniz?

Oyuncağın yapılandırılmış olması ve çocuğa çok fazla yapacak bir şey kalmaması açısından pedagojik açıdan çok katkıda bulunacağını düşünmüyorum.

10. Bu oyuncacı SADECE SÖZCÜK KULLANARAK nitelemeniz istense hangi sözcükleri kullanırdınız? Başka bir deyişle, bu oyuncacı sizde uyandırdığı çağrışımları belirten anahtar kelimeler neler olur?

Makarna gemisi, gemi, ejderha

11. Tasarımın beğendiğiniz-beğenmediğiniz veya gözden kaçtığını düşündüğünüz yönlerini açıklar mısınız? (Görsellerde size sunulan maket demo malzemelerden yapılmış fikir verici bir taslaktır. Son ürün değildir.)

Dayanıklı olacağını düşünmüyorum, yönlendirme mekanizmasını beğenmedim.

12. Oyuncacıya uygulanan karakter tasarımıyla ilgili görüşleriniz nelerdir? Bu anlamda, çizgi kahramanlar vb. öğelerin çocuklar için üretilen ürünlerin görsel tasarımlarında kullanılması olgusunu nasıl değerlendirirsiniz?

Karakter tasarımı beğendim ancak daha cinsiyetsiz bir çalışma olmasını tercih edebilirdim.

13. Son olarak eklemek istedikleriniz, gözden kaçtığını düşündüğünüz önemli konular nelerdir?

Hayır yok, yukarıda eksik gördüğüm noktaları belirttim.

Transcript 4:

4th Expert: Woman, 38

1. Kısaca kendinizi tanıtır mısınız? (...)

(...) Eğitim Yönetimi Yüksek Lisans Mezunuyum, MEB’de müdür yardımcısı olarak çalışmaktayım.

2. Literatürden bilindiği üzere, “oyun” ve “oyuncak”, çocuk gelişimi ve eğitiminde sıkça üstünde durulan kavramlar. Uzman bakış açısıyla, oyun ve oyuncacı size neyi ifade ettiğini özetler misiniz?

Oyun küçük büyük, yaşlı genç demeden her kesim için bir öğrenme ve eğlenme amaçlı yapılan bir etkinliktir. Oyuncak ise oyun için bir araçtır.

3. Sizce “oyuncaklar” ve “oyun malzemeleri” (veya araçları), TEKNİK ve/ya PRATİK anlamda birbirinden ayrı ele alınması gereken kavramlar mı? Bu anlamda bir ayrım yapmayı gerekli ve/ya mantıklı buluyor musunuz? Nedenleriyle açıklar mısınız?

Bence ayrı ele alınması gerekmez. İstenilen sonuca ulaşmak ikisinin de amacıdır.

4. Deniz/göl/havuz vb. sucul ortamların çocuk gelişiminde herhangi bir katkısından söz edilebilir mi? Eğer varsa, bu ne gibi etkileşimlerle, hangi gelişim alanlarında olmaktadır? Açıklar mısınız?

Çocuk gelişimine sucul ortamların katkısı vardır. Gelişim kavramı geniş açıdan ele alındığında bedensel, sosyal, fizyolojik ve psikolojik açılardan bir bütündür. Çocuk bu ortamlarda işitsel ve duyuşsal olarak etkileşime girerek gelişimine katkı sağlayabilir.

5. Binilebilen veya taşıma işlevi olan sucul ortam oyuncakları deyince ilk aklınıza gelen çeşitler ağırlıklı olarak ne türden oyuncaklardır? Bunlara alternatif çeşitler olabilir mi? Örnekler misiniz?

Şişme top vb farklı çeşitlerde şişme oyuncaklar binilebilen oyuncak türlerinden olabilir. Taşıma için ise kova kürek vb oyuncaklar aklıma geliyor.

6. Binilebilen veya taşıma işlevi olan sucul ortam oyuncaklarından herhangi bir pedagojik fayda sağlamak mümkün müdür? Sizce bu tür oyuncakların kullanımı için çocuk kullanıcıların ne gibi yeterliklere sahip olmaları gerekir?

Bu tür oyuncakların çocukların gelişimine faydası olur bence. Çünkü eşyayı kavrama-tutma becerisi, boşaltma-doldurma becerisi, miktar-hacim kavramı gibi kazanımların edinilmesini sağlar.

7. Havuz makarnaları (deniz makarnası, yüzme makarnası, sosis gibi adlarla da bilinir) konusunda bireysel ve/ya mesleki anlamda bilginiz, herhangi bir kullanım deneyiminiz var mı? Havuz makarnalarının daha başka kullanım alanları olabilir mi?

Bilgim yok.

8. Sizce bu tasarımın hedef kitlesi kaç yaş aralığı olmalı? Çocukların gelişim kategorileri (fiziksel-bilişsel vb.) üzerinden ve nedenleriyle ve/ya örneklerle açıklar mısınız?

7-11 yaş aralığı güvenlik açısından daha uygundur.

9. Size tanıtılan bu oyuncak önerisinin pedagojik anlamda gelişime katkı sağlama potansiyelini değerlendirir misiniz?

Eğlence amaçlı kullanılabilir.

10. Bu oyuncuğı SADECE SÖZCÜK KULLANARAK nitelemeniz istense hangi sözcükleri kullanırdınız? Başka bir deyişle, bu oyuncuğın sizde uyandırdığı çağrışımları belirten anahtar kelimeler neler olur?

Deniz kayığı

11. Tasarımın beğendiğiniz-beğenmediğiniz veya gözden kaçırdığını düşündüğünüz yönlerini açıklar mısınız? (Görsellerde size sunulan maket demo malzemelerden yapılmış fikir verici bir taslaktır. Son ürün değildir.)

Elle çevirme yerine bisiklet olarak kullanılması daha iyi olabilirdi.

12. Oyuncuğa uygulanan karakter tasarımıyla ilgili görüşleriniz nelerdir? Bu anlamda, çizgi kahramanlar vb. öğelerin çocuklar için üretilen ürünlerin görsel tasarımlarında kullanılması olgusunu nasıl değerlendirirsiniz?

Dikkat çekmek ve iyi pazarlama tekniğı olarak görmekteyim.

13. Son olarak eklemek istedikleriniz, gözden kaçtığını düşündüğünüz önemli konular nelerdir?

Yok.

Transcript 5:

5th Expert: Woman, 36

1. Kısaca kendinizi tanıtır mısınız? (...)

(...) Anaokulu Öğretmenliği/Okul Öncesi Eğitim.

2. Literatürden bilindiği üzere, “oyun” ve “oyuncak”, çocuk gelişimi ve eğitiminde sıkça üstünde durulan kavramlar. Uzman bakış açısıyla, oyun ve oyuncakın size neyi ifade ettiğini özetler misiniz?

Oyun ve oyuncak gerçek hayatın provasıdır.

3. Sizce “oyuncaklar” ve “oyun malzemeleri” (veya araçları), TEKNİK ve/ya PRATİK anlamda birbirinden ayrı ele alınması gereken kavramlar mı? Bu anlamda bir ayrım yapmayı gerekli ve/ya mantıklı buluyor musunuz? Nedenleriyle açıklar mısınız?

Ayrım yapmak mantıklı mıdır değil midir karar veremedim. Ama düşüncem şudur: Teknik; bir oyuncakın hangi materyal, hangi boyut, hangi şekillerde, hangi becerilere hizmet edeceğinin belirlendiği başlıktır. “Pratik” ise oyuncakların belirlenen yaş grubuna uygun, anlaşılır, yeterli ve faydalı olması, amaç ve kazanıma doğru hizmet etmesi demektir.

4. Deniz/göl/havuz vb. sucul ortamların çocuk gelişiminde herhangi bir katkısından söz edilebilir mi? Eğer varsa, bu ne gibi etkileşimlerle, hangi gelişim alanlarında olmaktadır? Açıklar mısınız?

Tabi ki katkısı vardır diye düşünüyorum. Su kenarında veya suyla oynanan oyunlar çocukların her gelişim alanına hitap eder. Suyla oynayabilecekleri oyunlar bir oyuncak bebek ya da oyuncak arabayla yapabileceklerinden daha fazla olabilir. Su kullanarak hayali yemek yapabilir, suyla bahçe sulayabilir, suyla herhangi bir maddeyi ıslatıp değişimi gözlemleyebilir, suyla oyuncaklarını yıkatabilir vs. Kendi çocukluğumda bebeklerimi yıkarken aldığım hazzı düşününce sulu oyunlar çocukları çoklu düşünmeye sevkeder, bu da yaratıcılığı geliştirir diyebilirim.

5. Binilebilen veya taşıma işlevi olan sucul ortam oyuncakları deyince ilk aklınıza gelen çeşitler ağırlıklı olarak ne türden oyuncaklardır? Bunlara alternatif çeşitler olabilir mi? Örnekler misiniz?

İlk aklıma gelen şişme deniz botu, can simitleri, kova takımları ve parasiling aracı olan muz geldi. Alternatif olarak suda okunabilen, oynanabilen su kitapları olabilir, plastik ya da kauçuk malzemeden su kitapları olabilir.

6. Binilebilen veya taşıma işlevi olan sucul ortam oyuncaklarından herhangi bir pedagojik fayda sağlamak mümkün müdür? Sizce bu tür oyuncakların kullanımı için çocuk kullanıcıların ne gibi yeterliklere sahip olmaları gerekir?

Sanırım üzerinden düşmemek için çaba harcanan parasiling oyuncaklarından bahsediliyor. Pedagojik olarak belki başarıma duygusuyla bağlantı kurulduğunda faydalı olarak düşünülebilir. Fakat bu oyuncaklar 12 yaş üstüne uygun olabilir diye düşünüyorum.

7. Havuz makarnaları (deniz makarnası, yüzme makarnası, sosis gibi adlarla da bilinir) konusunda bireysel ve/ya mesleki anlamda bilginiz, herhangi bir kullanım deneyiminiz var mı? Havuz makarnalarının daha başka kullanım alanları olabilir mi?

Havuz makarnalarıyla yüzmek çok keyifli. Anaokulunda sanatsal etkinlik materyali ve hatta el yapımı oyuncak materyali olarak kullanabiliyoruz.

8. Sizce bu tasarımın hedef kitlesi kaç yaş aralığı olmalı? Çocukların gelişim kategorileri (fiziksel-bilişsel vb.) üzerinden ve nedenleriyle ve/ya örneklerle açıklar mısınız?

12-16 yaşları

9. Size tanıtılan bu oyuncak önerisinin pedagojik anlamda gelişime katkı sağlama potansiyelini değerlendirir misiniz?

Büyük motor becerileri ve denge gerektiren hareketlere hizmet ettiğini düşünürsek psikomotor gelişimi destekler, grup oyunu gibi düşünülürse işbirliği duygusuna hizmet edebildiğinden sosyal-duygusal alanı destekler.

10. Bu oyuncakı SADECE SÖZCÜK KULLANARAK nitelemeniz istense hangi sözcükleri kullanırdınız? Başka bir deyişle, bu oyuncakın sizde uyandırdığı çağrışımları belirten anahtar kelimeler neler olur?

11. Tasarımın beğendiğiniz-beğenmediğiniz veya gözden kaçırdığınızı düşündüğünüz yönlerini açıklar mısınız? (Görsellerde size sunulan maket demo malzemelerden yapılmış fikir verici bir taslaktır. Son ürün değildir.)

12. Oyuncakta uygulanan karakter tasarımıyla ilgili görüşleriniz nelerdir? Bu anlamda, çizgi kahramanlar vb. öğelerin çocuklar için üretilen ürünlerin görsel tasarımlarında kullanılması olgusunu nasıl değerlendirirsiniz?

13. Son olarak eklemek istedikleriniz, gözden kaçırdığınızı düşündüğünüz önemli konular nelerdir?

Transcript 6:

6th Expert: Woman, 47

1. Kısaca kendinizi tanıtır mısınız? (...)

(...) Özel eğitim alan uzmanı psikologum/20 yıldır özel eğitim alanında çalışıyorum/(...) Psikoloji mezunuyum/Yüksek lisans (...) Özel Eğitim Bölümü.

2. Literatürden bilindiği üzere, “oyun” ve “oyuncak”, çocuk gelişimi ve eğitiminde sıkça üstünde durulan kavramlar. Uzman bakış açısıyla, oyun ve oyuncuğun size neyi ifade ettiğini özetler misiniz?

Oyun, çocukların sosyal gelişimini sağlayan, dil ve bilişsel süreçlerini geliştiren önemli süreçlerden biridir. Oyuncak da, bu süreçlerin etkili olmasını sağlayan araçtır.

3. Sizce “oyuncaklar” ve “oyun malzemeleri” (veya araçları), TEKNİK ve/ya PRATİK anlamda birbirinden ayrı ele alınması gereken kavramlar mı? Bu anlamda bir ayırım yapmayı gerekli ve/ya mantıklı buluyor musunuz? Nedenleriyle açıklar mısınız?

Bu konudaki soruyu açıklayıcı bulamadım, neye göre değerlendireceğimi anlayamadım. Oyuncaklar ya da oyun malzemeleri yaşa cinsiyete göre farklılaşmaktadır. Ancak teknik ve pratik ayırımını anlayamadım.

4. Deniz/göl/havuz vb. sucul ortamların çocuk gelişiminde herhangi bir katkısından söz edilebilir mi? Eğer varsa, bu ne gibi etkileşimlerle, hangi gelişim alanlarında olmaktadır? Açıklar mısınız?

Çocuk gelişiminde öğrenme becerileri görerek, duyarak, dokunarak olmaktadır. Bu özellikleri göz önüne aldığımızda, bu süreçte deniz, göl, havuz gibi sucul ortamların çocuk gelişiminde çok önemli bir yeri vardır. Bu gelişim süreçlerinde hem öğrenme, hem vücut farkındalığı, motor beceriler, dokunsal duyarlılık gibi pek çok alanda gelişimi olumlu etkilemektedir.

5. Binilebilen veya taşıma işlevi olan sucul ortam oyuncakları deyince ilk aklınıza gelen çeşitler ağırlıklı olarak ne türden oyuncaklardır? Bunlara alternatif çeşitler olabilir mi? Örnekler misiniz?

Deniz yatağı, kolluk, simit, sosis gibi nesnelere geliyor. Ancak alternatif örnekler veremem.

6. Binilebilen veya taşıma işlevi olan sucul ortam oyuncaklarından herhangi bir pedagojik fayda sağlamak mümkün müdür? Sizce bu tür oyuncakların kullanımı için çocuk kullanıcıların ne gibi yeterliklere sahip olmaları gerekir?

Tüm oyuncaklarda olduğu gibi yaş ve cinsiyet sucul ortam oyuncaklarının kullanımı için önemlidir.

7. Havuz makarnaları (deniz makarnası, yüzme makarnası, sosis gibi adlarla da bilinir) konusunda bireysel ve/ya mesleki anlamda bilginiz, herhangi bir kullanım deneyiminiz var mı? Havuz makarnalarının daha başka kullanım alanları olabilir mi?

Bu materyalleri sucul ortamda kullanma deneyimim (çocuklarla) maalesef olmadı.

8. Sizce bu tasarımın hedef kitlesi kaç yaş aralığı olmalı? Çocukların gelişim kategorileri (fiziksel-bilişsel vb.) üzerinden ve nedenleriyle ve/ya örneklerle açıklar mısınız?

Eğer bu materyali sürmek için pedal çevirmek gerekiyorsa, bisiklet sürme yaşı (motor koordinasyon) yaklaşık 3 yaş olduğuna göre 3-5 yaş aralığı olmalıdır. Ancak bu maketi kollar ile kürek çekme şeklinde aparat ekleyerek, hem sağ hem sol beyini çalıştıracak (çapraz koordinasyon) bir oyuncak haline getirilip 4-6 yaş da kullanılabilir.

9. Size tanıtılan bu oyuncak önerisinin pedagojik anlamda gelişime katkı sağlama potansiyelini değerlendirir misiniz?

Tüm oyuncaklar için geçerli olarak, oyuncaklar çocukların sosyal motor bilişsel süreçleri için önemlidir.

10. Bu oyuncacı SADECE SÖZCÜK KULLANARAK nitelemeniz istense hangi sözcükleri kullanırdınız? Başka bir deyişle, bu oyuncanın sizde uyandırdığı çağrışımları belirten anahtar kelimeler neler olur?

İlginç

11. Tasarımın beğendiğiniz-beğenmediğiniz veya gözden kaçtığını düşündüğünüz yönlerini açıklar mısınız? (Görsellerde size sunulan maket demo malzemelerden yapılmış fikir verici bir taslaktır. Son ürün değildir.)

Bu çeşit oyuncakları değişik örüntülerle yapmayı düşünebilirsiniz. Bence Venedik gondolu, Bandırma Vapuru ya da hayvanlar gibi. 3-5 yaş aralığındaki çocuklar bilgilendirici bir öykü ile bindirilebilir.

12. Oyuncaca uygulanan karakter tasarımıyla ilgili görüşleriniz nelerdir? Bu anlamda, çizgi kahramanlar vb. öğelerin çocuklar için üretilen ürünlerin görsel tasarımlarında kullanılması olgusunu nasıl değerlendirirsiniz?

Bir önceki soruda yanıtladım.

13. Son olarak eklemek istedikleriniz, gözden kaçtığını düşündüğünüz önemli konular nelerdir?

Teşekkürler

APPENDIX E

ANTHROPOMETRIC DEVELOPMENTAL STANDARDS OF TURKISH CHILDREN

		Bu çalışma	ABD ^{26,27} (2000)	Neyzi ve ark. ¹⁰ (1978)
3 ay	Ağırlık (kg)	5.8	5.5	5.4
	Boy (cm)	59.6	59.3	58.5
	Baş çevresi (cm)	40.0	39.9	40.0
6 ay	Ağırlık (kg)	7.4	7.2	7.4
	Boy (cm)	66.4	65.3	64.5
	Baş çevresi (cm)	42.9	42.4	42.8
1 yaş	Ağırlık (kg)	9.4	9.5	9.6
	Boy (cm)	75.1	73.8	73.0
	Baş çevresi (cm)	45.8	45.0	45.8
3 yaş	Ağırlık (kg)	14.2	13.9	14.0
	Boy (cm)	95.4	94.7	95.0
	Baş çevresi (cm)	48.7	48.6	49.3
6 yaş	Ağırlık (kg)	20.6	20.2	20.2
	Boy (cm)	115.1	114.7	114.0
9 yaş	Ağırlık (kg)	28.9	29.0	29.4
	Boy (cm)	132.1	132.9	130.5
12 yaş	Ağırlık (kg)	45.1	41.6	44.8
	Boy (cm)	153.1	151.2	152.5
15 yaş	Ağırlık (kg)	55.3	52.0	53.6
	Boy (cm)	161.7	161.9	159.5
17 yaş	Ağırlık (kg)	57.2	55.1	56.0
	Boy (cm)	162.7	162.9	160.0

Figure 46. Comparative anthropometric values for girls

(Source: Neyzi et al., 2008:13)

		Bu çalışma	ABD ^{26,27} (2000)	Neyzi ve ark. ¹⁰ (1978)
3 ay	Ağırlık (kg)	6.4	6.0	5.9
	Boy (cm)	61.3	60.8	60.5
	Baş çevresi (cm)	41.1	41.2	40.9
6 ay	Ağırlık (kg)	8.1	7.9	7.8
	Boy (cm)	68.0	67.0	66.5
	Baş çevresi (cm)	44.0	43.7	43.9
1 yaş	Ağırlık (kg)	10.2	10.3	10.0
	Boy (cm)	76.9	75.5	74.7
	Baş çevresi (cm)	47.1	46.3	47.8
3 yaş	Ağırlık (kg)	14.8	14.3	14.6
	Boy (cm)	96.8	95.8	95.3
	Baş çevresi (cm)	50.0	48.9	50.4
6 yaş	Ağırlık (kg)	20.7	20.7	20.8
	Boy (cm)	116.1	115.4	116.0
9 yaş	Ağırlık (kg)	28.8	28.5	29.5
	Boy (cm)	132.1	133.5	132.0
12 yaş	Ağırlık (kg)	44.3	40.5	43.1
	Boy (cm)	150.6	149.0	150.0
15 yaş	Ağırlık (kg)	62.1	56.3	58.3
	Boy (cm)	170.3	169.9	168.0
17 yaş	Ağırlık (kg)	69.2	64.6	66.2
	Boy (cm)	175.0	175.3	173.5

Figure 47. Comparative anthropometric values for boys

(Source: Neyzi et al., 2008:12)