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# Information and Communication Technologies as a Sustainable Competitive Advantage for Kindergartens and Pre-schools


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# Abstract - English

Title: Information and Communication Technologies as a Sustainable Competitive Advantage for Kindergartens and Pre-schools.

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This dissertation aims to understand the impact of Information and Communication Technologies (ICT) in Kindergartens and Pre-schools. In this thesis is tested if with the implementation of such technologies it is possible to create value for parents with children under 6 years-old and if it can became a sustainable competitive advantage.

Thus, a value creation model is developed based on four different ICT with distinct functionalities and purposes: GPS Bracelet, Communication Platform, Homework Software and Online Didactic Game. Four interviews and 113 online surveys is conducted to evaluate which of those technologies are more valuable to parents with kids under 6 years old and the characteristics of those who support each technology. Afterwards, a sustainability analysis according to RBV model is done for those technologies that have proven to create value for this population.

After this study, it is concluded that, in fact, some Information and Communication Technologies can create value to parents and they can also became a sustainable competitive advantage.

Key words: Information and communication technologies (ICT) as a sustained competitive advantage; ICT in Kindergartens; technology as competitive advantage for kindergartens; innovation and kindergartens.

# Abstract – Portuguese

Título: Information and Communication Technologies as a Sustainable Competitive Advantage for Kindergartens and Pre-schools.

Autor: Beatriz Pessoa de Araújo Ramos

Esta dissertação tem como objectivo principal compreender o impacto das tecnologias de informação e comunicação nas creches e jardins-de-infância. Assim, testou-se se a implementação de tais tecnologias poderia criar valor para os pais de crianças com menos de 6 anos e posteriormente tornar-se uma vantagem competitiva sustentável para a escola.

Para tal, é desenvolvido um modelo de criação de valor baseado em quatro tecnologias distintas com diferentes funcionalidades e finalidades: Uma pulseira GPS, uma Plataforma de Comunicação para os pais, um Software para trabalhos de casa e um jogo didáctico online. Quatro entrevistas e 113 inquéritos online foram, assim, realizados para perceber quais destas tecnologias são mais valorizadas por estes pais e quais as características dos adeptos de cada uma das tecnologias. Posto isto, é realizada uma análise da sustentabilidade das tecnologias que demostraram criar valor para os pais de acordo com o modelo RBV.

Desta forma, conclui-se que sim, é possível criar valor através de algumas das tecnologias de informação e comunicação, assim como torna-las uma vantagem competitiva sustentável.

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# Contents

# 1 Introduction

Information technology (IT) is changing not only the products' features, processes, companies, and industries but also the nature of the competition itself (Porter and Millar 1985). The same authors defend that companies need to realize that IT has more utility than just a tool for support services and, in fact, it can become a "substantial and sustainable competitive advantage". Moreover, this resource has proven to be one of the firm's strategic imperatives for delivering a quality customer service (Ray et al., 2005). Nowadays, this trend has change and Information and Communication Technologies (ICT) can be seen as an important marketing tool, to improve the relationship with current or potential customers and also as an additional service (UNDP report, 2001).

The exponential growth of technology is related with the increase of open mind people in our society, the development of IT systems and the intensification of the people dependence of information and communication technologies (ICT) which reflects on education and labor sectors (Schaff, A., 1990; Brito, R., 2010). Thus, it is necessary that schools keep up with new technologies in order to fulfill students' needs, the society and to continue being competitive in the market (Brito, R., 2010).

According to Amante (2007), ICT can have a positive impact not just on the nursery school itself but also on children, parents and teachers. Along with the same author, ICT influences the language development of the children as well as the mathematical reasoning, the knowledge of the world and, last but not least, ICT can help them to be more open to cultural diversity. However, it is not just about computers but about people and institutions.
At the same time, this dissertation aims to verify at what extent this technological impact can be relevant to parents as well, if ICT can improve somehow the parents satisfaction of the school. In this sense, the main goal of this thesis is to study the impact of ICT in schools for children with less than 6 years old or, in other words, understand the technological impact on kindergartens and preschools, as a company, and consequently on children, parents and educators. So, it can be interesting to evaluate at what extent this resource can create value to preschools' and kindergartens' customers through the implementation of ICT in their strategy.

Moreover, as a company that provides services, we can assume that as any other company, kindergarten or preschool could potentially benefit from ICT as well. Thus, if information and

communication technology allows companies to create a competitive advantage (Porter and Millar 1985) then we can analyze its sustainability using one of the existing theories, which is Resource-based view (RBV) theory, that analyses the firm's resources according to their value, rarity, imitability and substitutability (Barney, 1991).

In this context, these topics lead to the two main questions of this thesis: Is it possible to create value to kindergartens and preschools through the implementation of information and communication technologies? Can kindergartens and preschools use this value as sustainable competitive advantage?

As a result, this research attempts to test a few ICT solutions in order to evaluate if they can become a strategy for this type of schools, through the creation of value to their customers, and also if they can support and guarantee a competitive advantage. In other words, the aim of this research is to understand what information and communication technologies within the solutions tested would create value for the school, parents and children and delineate a possible strategy. Besides exploring the possibilities of gaining a competitive advantage, it is also a goal to find how to support this advantage in the future and how to integrate this strategy within the company in a way that is not perfectly imitable by competitors and thus how to make it a sustainable competitive advantage.

Firstly, to address these issues an analysis model is developed to describe how it is planned to achieve the information for address the research questions together with the research techniques necessary for that. It tries to explore which of the proposed ICT technologies attract and have more value to the customers. After perceiving the main areas that are more interesting to customers, an analysis of the sustainability of these ICT strategies are done according to the RBV theory.

This analysis model includes the accomplishment of surveys and personal interviews to consumers, i.e. parents, in order to obtain qualitative and quantitative data about the importance of ICT in kindergartens and preschools. This methodology also helps to verify if there is creation of value due to ICT solutions proposed on the analysis model from a costumer's perspective.

This thesis is organized as follows. First, theoretical content is presented based on academic journals and papers, where is provided information about ICT, ICT in Portugal, kindergartens

and preschools, ICT in schools and RBV model. After this chapter, it is introduced the methodology used during this study composed by the model analysis that includes the strategies proposal followed by the analysis of this research with some intermediary conclusions. Afterward, the final conclusions chapter follows, which leads to the main conclusion that answers to the research question of this thesis. Lastly, the final two chapters are References and Appendixes.

# 2 Literature Review

In this chapter, some researchers' points of view are cited in order to have a brief understanding about key concept of this dissertation.
First of all, a definition of information and communication technologies will be presented, follow by the ICT in Portugal, a short definition of kindergartens and preschools, then the difference and relation between kindergartens and preschools and ICT and finally what is a sustained competitive advantage regarding the resource-based view model.

## 2.1 ICT

For some authors, information and communication technology is a set of software, hardware, networks and people (Li-Hua & Khalil, 2006; UNDP report, 2001). While for others, it is the transformation process of data into information that can be used by managers for the decision-making process (Carr, 2003).

Nowadays, ICT can be seen as an important tool for marketing and the relationship with current or potential customers and also as an additional firm's service (UNDP report, 2001). Moreover, the same source states that ICT boosts the flow process of information, capital, ideas and products all around the world.

Aldhmour & Shannak (2009) aggregated all these definitions resulting into the following characterization: "ICT includes all the technology that facilitates the processing, transfer and exchange of information and communication services. It is considered as a subject of expertise that links information technology (computers and applications) and telecommunication networks (intranet and internet), that lets people and computers interrelate irrespective of physical location. ICT term contains hardware, software, networks and people that should be

integrated as a one unit by linking each one to the other in a clear process to generate the information that helps the decision makers, producing product and services presenting, promotion, controlling and for achieving the organization's aims and goals".

Regarding its spread around the world, Huang & Palvia (2001) believe that ICT are not homogeneous due to the differences between developed and developing countries. The authors pointed out some reasons for that gap, namely, economic factors, ICT infrastructures, governmental policies, cultural values, size of companies and lack of ICT maturity.
On the next section, it will be seen that this asymmetry also occurs within Portugal.

## 2.2 ICT in Portugal

The following paragraphs are a summary of a study conducted by Instituto Nacional de Estatistica (INE) and Agência para a Sociedade do Conhecimento (UMIC) in 2006 about ICT in Portugal.
The first point is about the national penetration ratios. Not surprisingly, the most relevant ICT in Portugal is the television with 100% of utilization, followed by the cell phone and the telephone with the 86% and 71% respectively. After these technologies, the computer appears with a penetration ratio of 45% and the desktop with 40%.
Despite the growth along the years, there are still asymmetries across the country with Lisbon in the top of the list (53% of penetration ratio in 2006) and Algarve in the bottom (42%).

Regarding the internet access, it has been observed an enlargement although the penetration ratio was only equal to 35% in 2006. Again, the country asymmetries can be observed with Alentejo accounting 27% while Lisbon as the highest rate equal to 41%.
Despite the growth rate between 2002 and 2006 of 332,5% (Anacom), this percentage is still above the European Union average (52%). The reasons given by respondents for not having internet access are the lack of utility (56%), the cost (51%) and the lack of skills needed for the utilization (33%). Additionally, another reason for this disparity is the cable distribution which is not equally distributed across the country.
In 2006, the range of population between 16 and 24 years old were the massive computer users with 83%. Moreover, the population with high education level has a 91% rate of computer utilization and the students with 99%. Further, this study revealed that 42% has acquired the computer and internet skills by himself, 40% with their families and friends and

26% due to books and CD-ROMs. Only 36% acquire these skills due to a training obtained by an accredited institution.

Regarding the ICT in the educational institutions, the ratio of students per computer has decreased from 17,3 (2002) to 10,5 (2006) and in average, in 2006, 14 students shared a computer with internet access (against 34 in 2002). Furthermore, as it increases the level of education the number of students per computer decreases.

In conclusion, the asymmetries of Portugal will still grow in the same direction keeping small cities apart from big cities. Then, the two group of people that show a higher resistance in the computer and internet utilization are the old people or/and with a low education level. This study also conclude that people that do not use internet in their homes say that they do not see any need or utility in this technology, or they complain about the high cost or even lack of skills in both technical and linguistic level.

## 2.3 Kindergarten and Preschool

In this section the definitions of kindergarten, nursery and preschool are presented in order to distinguish these concepts.

A nursery is an institution with a social-educative nature devoted to support both family and child, with the purpose of host children under 3 years old during the period that their parents cannot exercise their parental responsibilities (Portaria n.º 262/2011). According to the Oxford universal dictionary (1965) preschool and nursery are synonymous and thus have the same definition.

While according to the same dictionary, kindergarten is a “school for developing the intelligence of young children by object-lessons, toys, games, singing, etc”. Besides, this is the space where children must be after nursery/preschools and before going to primary school.

Both the Portuguese Decree-law nº 542/79 and Portaria n.º 262/2011 identified some common goals of nurseries and kindergartens that complement these definitions.

According to these documents the learning process in a joint effort between the family and the school with the aspiration to provide a proper development of the children, to promote stability and safety to children, to enhance capabilities of expression, communication and creation, wakening the curiosity about the world around us, encouraging group activities and

social interactions and ensuring the active participation of the family with a complete knowledge of the school and the children's development.

## 2.4 ICT in kindergartens

According to Amante (2003), NAEYC (1996) and Ramos et al. (2003) the impact of ICT on the learning process in the childhood is clearly positive. In fact, it can help children to develop the language and literacy skills, the mathematic reasoning, the world knowledge as well as educate about cultural diversity.

Regarding the development of language and literary, studies conducted revealed that videogames encourage a more fluent and complex speech (Davidson & Wright, 1994) while the computer programs, such as painting or word, can stimulate creativity and conversations about their achievements (Clement and Nastasi, 2002). It also helps the interaction between children and even the diction of kids with speech problems (Amante, 2003).

Some authors enumerate examples of ICT that have a positive impact somehow. Firstly, Lefever-Davis & Pearman (2005) and Trushell, Maitland & Burrel (2003) referred that the utilization of electronic tales books or even the creation itself of those books can have a positive impact both the children and the teachers. Additionally, Lewis (2000) claimed that multimedia programs can help the pronunciation as well. Finally, another example is the utilization of Email that allows kids to share stories, messages, drawings, etc. which can be very motivating and estimulate the taste of learning (Amante, 2003, 2004a; Siraj-Blatchford & Whitebread, 2003).

At the same time, the development of mathematic reasoning is shown by the improvement of the logical, geometric, numeric and spatial thinking (Clements & Swaminthan, 1995).

Technology, and particularly the internet, can also provide a wider perspective of the world either the surrounding environment or a further world with different people and cultures (Amante, 2007). Images, sounds, new multimedia content, the opportunity of meeting new people and a huge range of information are some of the innumerous benefits that both children and teachers can take away from internet (Haugland and Wright, 1997; Grácio, 2002; and Rada, 2004). In other words, information and communication technologies are able to

respond to the natural and unceasing curiosity of these young people. On the other hand, it allows children to do their assignments online or to share photos with their parents, or even publish some comments of the school's website or blog. This exposition gives a sense of responsibility and recognition that is positive and rewarding for the kid (Amante, 2003; Cotrim, 2007; Drogas, 2007). The email is also a key tool to improve communication and writing skills due to the easily texting, sharing photos, drawings and stories (Amante, 2007).
Moreover, ICT, and particularly the internet, can contribute to the acceptance of cultural diversity (Haugland & Wright, 1997), whch is essential to the future namely, to turn children into a tolerant and reasonable person (Amante, 2007).

As it was said above, it is not only important the utilization and integration of ICT. There are other topics that matters at the moment of learning (Coll, 1992).
First, the learning process should be dynamic together with new experiences so it would not become just an accumulation of knowledge (Coll, 1992). The computer usage must be supervised by the educator in order to orient and maximize its benefits by making questions about the procedures and make children reflect about their activities (Amante, 2004b; Clements, 1999; Clements & Nastasi, 2002).

Second, this knowledge must be meaningful and functional (Jonassen et al., 2003). Then, the process should include interactions with other people in a social context and not in an isolated way (Coll, 1992) which leads to the conclusion that, computers should be allocated inside the classroom and not in a separated area because children will have the opportunity of sharing the computer with other students and thus their interaction will be encouraged (Haugland, 2002).

In accordance with a study realized, computer programs used by children should be open-ended to explore their imagination, user friendly, attractive, intuitive, and flexible enough to meet different needs and educational goals. This represents an important role since it gives the opportunity of making choices related to the real life and it encourages the interaction between the children. Besides, these programs must provide information to adults about the proper age, goals and suggestions about the monitoring (Amante, 2007).

Beyond the impact on the children and teacher, schools can take some benefits from ICT as well. Even though, it requires a positive attitude and a favorable adherence to new procedures including a continuous support to teachers, giving them the opportunity to explore and try new ideas (Perrenoud, 1994). At the same time, this open mind grants the organization a

better environment within the company, because teachers feel recognized and believe the school is investing on their skills (Thurler, 1994).

Last but not least, ICT can also help the communication with the family. It can stimulate the relationship between parents and sons, giving them the opportunity to have a more active role in their son's life at school or it can facilitate the contact between parents and teacher, providing them the possibility of being always updated about their son's activities and wellbeing (Amante, 2007).

In fact, it is not just to teach children how to use ICT but how to use it in a way that induces to their education development (Pierce, 1994). Thus, just introduce computers and internet in kindergartens is not sufficient. Teachers should be educated and well-informed about ICT to reduce their anxiety while they are working with these technologies, avoiding the misused of this resource and to improve the children's learning experience (Miranda, 2006). Indeed, this fact can become an obstacle to the implementation of such technologies in the learning environment. Some schools are not ready to incorporate ICT given the lack of preparation of the teachers and educators (Ponte, 2002; Stables, 1997). Therefore, the following measures are some examples of what it can be done to support teachers to surpass this barrier: improve the teachers' comprehension and self-confidence about technology; make them understand that technology can be incorporated in the classroom which can boost the learning process; identify activities that teacher can try before taking to class and give them the opportunity to share among each other the good practices (Miranda, 2006).

In fact, a study of Paiva (2002) shows that in a sample of 2000 teacher, almost 50% did not have any training in Information and communications technologies. As it was said before, this percentage might be a problem by the moment of the implementation of such strategies because it is possible that there is a significant number of teachers that are not completely comfortable with it and therefore it will influence the learning experience.

In this sense, in the past years, the most common practice is to use only basic technologic tools in the pedagogical practices, such as OHP and simple internet navigation (Silva, 2004; Silva, 2003). Indeed, the teacher's technological skills often are due to self-formation or with help of friends and family. This fact is related with the lack of the schools incentives and monitoring about this issue (Miranda, 2006).

## 2.5 Resource Based View Model

According to Ray et al. (2005), differences in performance can be explained by different resources and skills of the companies.
To better understand this idea, some key concepts will be provide hereafter, namely firm resources, competitive advantage and sustained competitive advantage for a better comprehension of the analysis made later on.

The resources of a certain firm are the set of "all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc." possessed by that firm which will allow implementing a strategy to improve efficiency and effectiveness (Daft, 1983).

A competitive advantage occurs when a company creates value through the implementation of a strategy that is not owned in the same way by any other firm in the market (Porter, 1981). While, a sustained competitive advantage includes the situation that competitors are not able to benefit, even with some effort, in the same extent of this strategy. A sustainable competitive advantage is not necessarily related to certain period of time, i.e. if it is sustainable it does not mean that it will be sustainable forever rather that it will be in a superior position while other firms try to imitate that strategy (Barney, 1991).
According to the same author, within an industry, firms can conceive and implement a similar strategy and thus increase their performance at the same extent because they all have access to the same resources. However, a firm that implements a strategy before their competitors can obtain a competitive advantage by developing distribution channels, reputation and a relationship with customers. Although, it requires an additional resource, that other firms do not possessed, in order to become a sustainable competitive advantage.

Resource-based theory (RBV) does an internal analysis about strengths and weaknesses of a firm (Barney, 1991), helping to have a better understanding about the resources and the way they affect the sustainability of a competitive advantage (Ray et al., 2005) and that is the theory that this dissertation uses to do the analysis afterwards.

Before explaining RBV theory, the two assumptions that support this theory are presented hereafter.

First, it is assumed that competing firms have different strategic resources, i.e. it might exist heterogeneous resources across an industry otherwise it would be impossible to have a competitive advantage. The second assumption states that not all these resources are completely mobile, meaning that they cannot be bought in the market, because no company could sustain its competitive advantage if it was available in the market and so heterogeneity would be extremely perishable. Moreover, it is quite likely that competing companies have or seek for similar strategic relevant resources (Porter, 1981). In this sense, in order to gain a sustainable competitive advantage firms should have heterogeneous and immobile resources (Barney, 1991).

In the regard of the same author, the following paragraphs explain the four major categories used to evaluate a resource defined by RBV model: value, rarity, imitability and substitutability.

To Barney (1991), a valuable resource allows a company to find new opportunities and minimize threats, by increasing effectiveness and efficiency which leads to an absolute boost in the performance level of a process. Although, this boost does not mean a relative improvement on the performance comparing with the competing firms, i.e., the resource value only explains variance in performance across competing firms if it is also rare and costly to imitate otherwise it is just an improvement within the company (Barney, 1991).
In order to be rare, a resource cannot be owned by other competing, or potentially competing, companies. If several competitors have the same resource, then they have access to the same benefits, so there is no competitive advantage, even if it is a valuable resource. Although, a non-rare resource are also important as long as it helps to sustain the company in the market (Barney, 1991). To be considered as rare, a valuable resource must be controlled by fewer firms than those needed to create a perfect dynamic competition (Hirshleifer, 1980), and then it is possible to gain a competitive advantage.

Nonetheless, these two attributes (value and rarity) only make a competitive advantage sustainable if competitors cannot obtain or perfectly imitate them (Barney, 1991). In accordance with the same author, there are three main reasons that explain why is that possible, as it can be seen below.
The first reason is when a resource is created due to unique historical conditions. Resources that are related to a specific time and space can result into this type of distinctive events. Thus, it is very difficult to another company perfectly imitate those resources because they cannot

duplicate the same time and space conditions. In other words, when a company has a valuable and rare resource due to a given path which in turn allowed to put into practice a valuable strategy, then its competitors who do not have the same historical line would not be able to acquire such resource and therefore to create value through the same strategy (Barney, 1991).

To Barney, the second reason is when the relation between a controlled resource and the sustained competitive advantage is casually ambiguous. When a link is casual ambiguous, it means that other organizations do not know which resources are responsible to such advantage or how to use those resources in order to create the same value, and thus it becomes impossible to imitate such strategy and benefit from the exactly same competitive advantage. However, companies can fight back this disadvantage by acquiring the knowledge needed to create value through such resource, for example, hiring specialized personnel. In accordance with Lippman & Rumelt (1982), in order to have impact on competitive advantage, casual ambiguity must exist transversely in the market, i.e. "all competing firms must have an imperfect understanding of the link between the resources controlled by a firm and a firm's competitive advantage" because if it is completely clear to a certain company how that advantage is generated then it means that the remain organizations can acquire that knowledge as well (Barney, 1991).

Last but not least, again based on Barney (1991) the third reason is related to social complexity. A socially complex resource can be, for instance, the relationship with suppliers and customers (Porter, 1981), the companies' culture (Barney, 1986), etc. Therefore, in some of these situations it is possible to know why they create value, or in other words they are poorly casually ambiguous but, on the other hand, companies that do not control such social complex attributes might not be able to reproduce them as well(Barney, 1991).

Regarding substitutability, to generate a sustained competitive advantage, any strategic equivalent resource should exist, being at the same time valuable, rare and non-imitable. There are two ways to be substitutable, when two similar resources generate the same strategy and when different resources are strategically substitutes. An example of the last one is a manager that has a clear vision of the future and a firm that has a formal planning system resulting into the implementation of the same strategy however the visionary manager is probably rare and imperfectly imitable contrary to the planning system (Barney, 1991).

Following the same researcher, it is important to underline for this study that physical technology, such as information management systems or machine tools, are by definition imitable. Although, if a firm combines it with a valuable, rare, non-imitable and without

substitute phenomena, then it can explore this technology in a unique way and, as a result, obtain a competitive advantage.

For instance, a computer by itself is not an advantage (Hays & Wheelswright, 1984) but combined with an informal and formal management decision making-process it might be. That link between management and computers might be rare (Christie, 1985) and social complex and thus imperfectly imitable (Barney, 1991). Concerning substitutability, if we compare an efficient flow of information among highly experienced management team and an information management system, then they can be substitutes. "However, the existence of substitutes by itself does not mean that a particular firm resource cannot be a source of a sustained competitive advantage" (Barney, 1991). While the experienced managers are likely to be rare, given their social complexity and hence probably resulting in an imperfectly imitable resource, the information management system is not. Although, the two resources together are likely to gain sustained competitive advantage (Barney, 1991).

Below it can be found a figure that illustrates and summarizes the RBV model components:

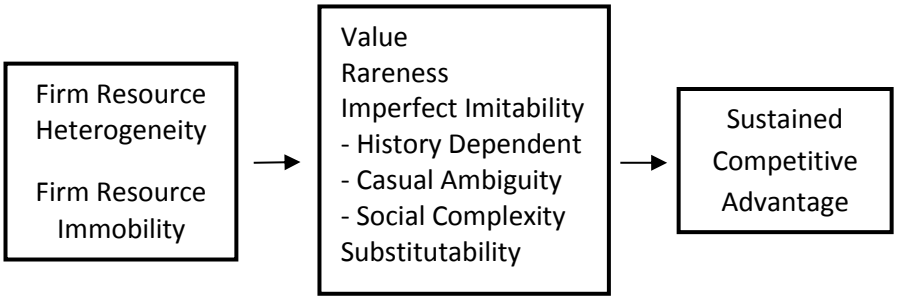



Figure 1- Relationship between Resource Heterogeneity and Immobility and Value, Rareness, Imperfect Imitability and Substitutability and Sustained Competitive Advantage (Barney, 1991)

# 3 Methodology and Research Model

This chapter contains detailed information about the necessary steps to reach the answer of the main research question of this thesis.

Firstly, the model that supports and explains the study process is presented followed by the four technologies proposed, the hypothesis made that help to reach the final conclusion and the research methodology used that relies on those hypothesis.

## 3.1 Research Model

Recalling, the main goal of this thesis is to find at what extent ICT can be strategically valuable for kindergartens and preschools in a sustained way, or in other words, is to understand if it is possible to create value to kindergartens and preschools through the implementation of information and communication technologies and if kindergartens and preschools can use this value as sustainable competitive advantage.

In order to study this research question four technologies were designed: a GPS bracelet, a Communication Platform, Homework Software and a Didactic Online Game.

Obviously, more information and communication technologies could be tested. However, these four technologies cover a diversified range of issues such as security, communication, learning, development, instructive entertainment, physically active games and socialization.

To be more precise, GPS bracelet aims to address one of the main concerns of parents: security. Besides, it is also useful to the school for avoiding incidents.

The communication platform helps to improve the communication between educators and parents, helping the last ones to have a more homogeneous, on-time, interesting and detailed information about their sons. Additionally, as it will be explained better below, it can possibly facilitate children's development.

The homework software intends to support the learning and development process by complementing in a more interactive and dynamic way.

Finally, the didactic online game tries to be an alternative to the games that are not educational or do not contribute to the children knowledge and learning process. The physical activity and the social component are two additional features of this proposed strategy as well.

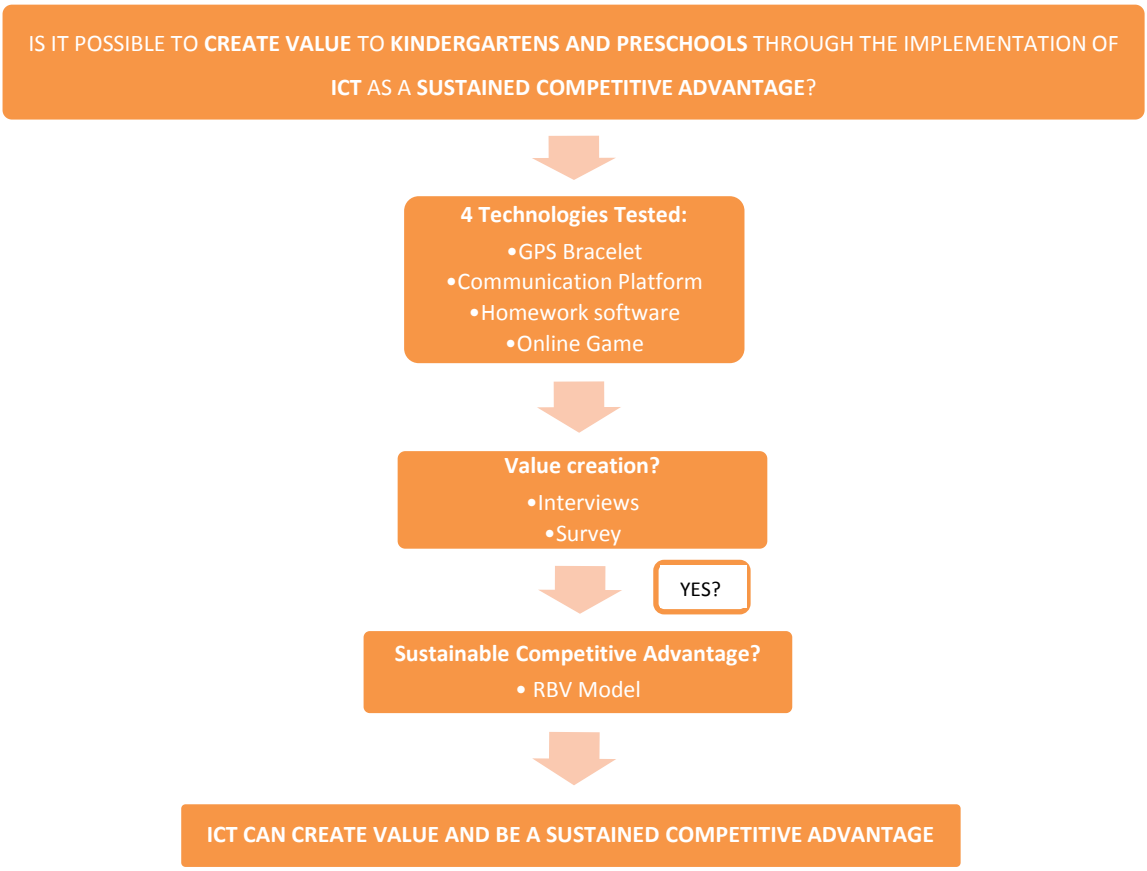
All of these features and goals of these ICT strategies will be better developed in the next section.

After presenting these four technologies in detail, 10 hypotheses are raised with the purpose of supporting the final conclusions. These hypotheses, aim to perceive the impact of demographic aspects like age, gender or location of residence on evaluation of the proposed ICT strategies as well as the importance given to each technology.

According to these hypotheses, an interview (Exhibit 1) and an online survey (Exhibit 6) are design. The first one aims to collect qualitative data, to get a better understanding about the parent's perspective and expectations regarding their son's school. This method also has the purpose of supporting the survey's structure and answers presented and to do some adjustments if needed. After these adjustments, the final survey is conducted online until collect a significant sample of respondents.

Next, all these answers are submitted to a data treatment through Excel and SPSS, so the statistical analysis can be made. The statistical techniques used to help the issue reflection and to reach the conclusions are: frequencies, pivot tables, Pearson correlation and segmentation.

Below, follows a resume of this model:




The following four sections explain in detail the four different information and communication technologies that this dissertation wants to test.

## 3.2 ICT Proposal

### 3.2.1 GPS bracelet

One of the technologies that this study aims to analyze is a GPS bracelet. This object would have the function of detecting the children's position wherever they go, so parents would be more relaxed about their son's wellbeing and safety. In this sense, parents would be able to check, any time, their son's geographic position through an online platform or receive an alert on their email or cellphone in the case their son leaves the school or the supposed perimeter.

Accordingly, the school would need to provide both the bracelet and the access to the online platform. Despite being a costly device, the fact of reducing the risk of losing a child while he is in an outside activity, for example, might compensate that cost.

For privacy reasons, each parent would only be able to see the location of their own son but the school would be able to see every child in order to be capable to have a fast response in an emergency case. However, some parents can feel uncomfortable with this kind of device or consider this an invasion of privacy or even do not have access to a computer or Smartphone and so this device do not have any direct utility for them and they would be dependent on the school.

Since this dissertation lies on children under 6 years old, the bracelet could be more important when they go out in a study visit or any activity outside the school. This means that, this is a proper device for kids between 2 and 6 years old, the age when they start leaving the school with educators. Otherwise they are not expected to leave the school area and thus the school would not have many reasons to provide this service to parents given its lack of utility.

As a consequence, kindergartens would have to consider two options: allow parents to decide if they want to use this device or if they will institute GPS Bracelet as a mandatory accessory for outside activities. With the first option they will maximize parents' satisfaction, because only the interested parents will pay for this service. On the other hand, this can be a big risk for the school because the number of parents that adhere to this service might not be sufficient to cover the investment done by the school. Contrary, the second option can be considered a strategic move in the market, with the school position itself as a safe and concerned school but it can result in the loss of clients.

### 3.2.2 Communication Platform

Another alternative is a platform that facilitates the communication between educators and parents. More precisely, this online platform would allow educators to post information about several topics such as alimentation, behaviors, achievements, diseases, etc in relation to each child individually which would be available only to the respective parents. In addition, teachers could also post information of the classroom, in general, that they are responsible for which would be available to every parent of that classroom. By saying information it means that it would be possible to publish not just written comments but also photos, videos and all the

multimedia content teachers want. As a result, parents would receive on-time feedback, through an online platform, or a summary report in the end of the day or week, on their email, according to their preference.

This service is useful for all the parents that have their sons in kindergartens and preschools, allowing them to have more information about their son's life in school. Besides, in a long term, it can save money for the school, given the fact of this service replaces the use of paper or boards for changing notes between parents and teacher.

Moreover, this platform is in accordance to the Portuguese Decree-Law nº 542/79 of the kindergarten statute which says that educators must work together with parents (Section 1 Art. 48.º - 1), clarify the family about the goals and methods of the activities developed in school (Chapter VII Art. 27.º b)) and also create a biographic register of each child (Chapter VIII, Art. 29.º 1) which can be kept by the parents.

Another positive aspect is the fact that this service would allow both mother and father to have the same information, regardless who is going to pick up the child at the school.

Although, this service can face some obstacles too. For instance, lack of effort of teachers on posting information and interacting with the parents, which can damage their relationship and the implementation of this service. The last obstacle is related with two major problems: lack of teachers' preparation or lack of parents' familiarization with technologies. According to Pontes (2002), Stables (1997) and Paiva (2002), there is a significant number of teachers that are not prepared to work with ICT and, thus, they will jeopardize the implementation of this technology. On the other hand, the lack of familiarization can come from the parents, who can be not comfortable with email and internet or even do not have access to computers or Smartphones.

### 3.2.3 Online Homework

This third ICT, lies on the idea of schools develop a software where kids could do their homework, allowing them not only to consolidate the subjects they learn in class but also to develop computer skills. The content of this online homework would be similar with the traditional homework book but with the difference of being more interactive, visually motivating and to stimulate more the children's creativity developing his hard and soft skills.

In fact, there are a lot of schools in Portugal that choose not to give any homework in kindergartens, although this software would be very useful for children with ages between 4 and 6 years old, to prepare themselves to go to the primary school. In this way, teachers could begin to implement the homework habits since young ages, in a more interactive and instructive manner. According to Amante (2007 and 2003) NAEYC (1996) and Ramos et al.(2003), this methodology might have a positive impact on the children's learning process, helping them to develop computer, written, diction and mathematical reasoning skills.

Since these children cannot read or write, they can be asked only to associate images, colors and songs which can result in an improvement on logic, mathematical, spatial skills as well as an increase of vocabulary. Despite not practicing the handwriting skill, they can develop other capabilities and thus complement it with other type of homework. This way, children would be more motivated and we can assume that the learning process would be more efficient and effective.

In addition, it can also help the educator since it would be easier to control who did the homework and who did not. Thus, a better evaluation of each student's difficulties can be done in order to give a personalized and improved support later on. Besides, according to Amante (2007), when children are monitored by an adult the learning process can be enhanced. So, it is important to help them doing the homework properly and also to make them explain why they are doing it in that way, which can, in its turn, improve their capability of express themselves.

Besides, if the school has a website and expose the best homework done it can arouse a sense of responsibility and recognition that is positive for kids (Amante, 2003; Cotrim, 2007; Drogas, 2007).

### 3.2.4 Didactic Online Games

Finally, the school could develop an online didactic game to stimulate children according to their age and degree in school. This solution is destined for kids between 3 and 6 years old ad it is similar to the previous option with the difference that children do not have the obligation to use this service.

Hence, the school needs to create a software that is user friendly, attractive, intuitive, and flexible enough to meet different needs and educational goals (Amante, 2007) and at the same time stimulate kids to use it. Since this is an online game they could play against their classmates and thus encouraging their interaction (Coll, 1992; Crook, 1998a, 1998b). This game should also be realistic enough to have a practical utility in the children's life (Jonassen et al., 2003). In addition, they could play sometimes this game in class so children could share a computer and play together as it was suggested by Haugland (2002).

Recalling what it was said before, Davidson & Wright (1994) suggested that videogames encourage a more fluent and complex speech, while the computer programs, such as painting or word, can stimulate creativity and to talk about their achievements (Clement and Nastasi, 2002). It also helps the interaction between the children (Amante, 2003) and even the diction of children with speech problems (McCormick, 1987, cit. by Van Scoter et al., 2001).

Again, similarly to the homework software, children should be monitored by the parents or teachers, in order to boost their learning which can be also a mean to strengthen their relationship.

This technology may be a valuable alternative to the regular games that do not have didactic content and that do not encourage live interaction with other children.

## 3.3 Hypothesis

In order to achieve the key conclusions and answer the two main research questions, some hypotheses are raised. Particularly, these hypotheses will be the base of the interviews and the survey conducted and so they are essential to the analysis done afterwards.

The hypotheses presented are separated by two major groups and purposes. The first set of hypotheses (H1 – H6) is related with the characteristics of the sample and their technology preference which will help to do customer segmentation on the Analysis chapter later.
Hence, it began by assessing the impact of parent's ages on the technologies preference:

**H1**- Age has impact on the technologies preference.

Again, it is interesting to observe if women has distinct preferences comparing with men.

**H2**- Gender has impact on the technologies preference.

The third and fourth hypotheses suggest that the number of sons and the son's age may influence parents' preference, for instance as the paternal experience increases their needs as parents might change.

**H3-** The number of sons has impact on the technologies preference.

**H4-** The sons' age has impact on the technologies preference.

Then, the impact of residence or the school's location is evaluated in order to find out the asymmetry of the several locations presented in the survey. As a result, the following hypotheses come up:

**H5**- The residence location have impact on the technologies preference.

**H6-** The school location has impact on the technologies preference.

The second set of hypotheses aims to help reaching the intermediary conclusions of this dissertation. The four following hypotheses intend to evaluate the perceived value of each technology, based on the respondent's interest, influence in their school choice and their average amount that they are willing to pay it.

**H7-** GPS bracelet is valuable for parents.

**H8**- Homework Software is valuable for parents.

**H9-** Communication Platform is valuable for parents.

**H10-** Online Didactic Game is valuable for parents.

The table presented below combines these 10 hypotheses with the survey questions which are presented in detail on the next chapter and can be seen on Exhibit 6.

| HYPOTHESES | QUESTIONS ON THE SURVEY |
|---|---|
| **H1 - Age has impact on the technologies preference.** | Q1 + Q27 |
| **H2- Gender has impact on the technologies preference.** | Q2+ Q27 |
| **H3 - The number of sons has impact on the technologies preference.** | Q3 + Q27 |
| **H4 - The sons' age has impact on the technologies preference.** | Q4 + Q27 |
| **H5- The residence location have impact on the technologies preference.** | Q5 + Q27 |
| **H6- The school location has impact on the technologies preference.** | Q6 + Q27 |
| **H7- GPS bracelet is valuable for parents.** | Q11 + Q12 + Q13 + Q14 |
| **H8 - Homework Software is valuable for parents.** | Q15 + Q16 + Q17 + Q18 |
| **H9 - Communication Platform is valuable for parents.** | Q19 + Q20 + Q21 + Q22 |
| **H10 - Online Didactic Game is valuable for parents.** | Q23 + Q24 + Q25 + Q26 |

## 3.4 Survey Methodology

This section presents the research methodology used to collect the data necessary to address the research question based on the literature referred above.

As it was said before, both qualitative and quantitative research is done in order to obtain a broader perspective for answering the following research questions: Is it possible to create value to kindergartens and preschools through the implementation of information and communication technologies? Can kindergartens and preschools use this value as sustainable competitive advantage?

Firstly, with the purpose of collecting qualitative data, some interviews are conducted to understand the parents' point of view about the school and information and communication technologies. Hence, four parents, two mothers and two fathers with sons aged between 2 and 6 years, answered a few questions concerning their expectations about the school and ICT, more precisely what they think about their son's school, what kind of features are provided nowadays, what kind of features they would like to be provided, how they evaluate the ICT proposed and what is their opinion about them.

Taking into account this data and the literature above, the following step is an online survey for parents with children within the target ages to obtain quantitative data. The main purpose

of this method is to identify which ICT areas according to the features presented are the most attractive to the respondents and their general acceptance and understanding of this kind of technologies. This online survey is divided in two main parts. The first one consists in some demographic questions and parents' opinion about their son's current school. The second part is related with their perspective about the technologies tested on this thesis.

The reason for both survey and interviews were done based on parents' opinion is because they are the decision-making consumers and thus regarding the main purpose of this thesis, the key interest is to know their opinion as customers.

Next, after collecting these results and conclusions about following hypotheses, segmentation is done in order to discover the relation between those segments and technologies preferences.

### 3.4.1 Interviews

As it was said before, the four interviews done have the purpose of getting a better understanding about the parents' main concerns and then, based on that, adjust the online survey with more accurate alternative choices to answer. The questions asked on the interview can be found in Exhibit 1.

In order to avoid gender asymmetries, two couples, with distinct ages that live in different areas of the city, are interviewed, allowing to have a wider and not biased sample. Although, the reason for choosing couples is to understand the two perspectives about the same school and to verify how unlikely is the opinion of two people within the same social environment. Besides, there was a concern in choosing a couple with two kids and a couple with just only one child to perceive if paternal experience has any impact on the way parents think.

The first couple lives in Cascais, where is also the school of their two boys. The mother has 42 years while the father has 45 and their kids have 8 and 5 years old.

The second couple lives in Odivelas and again this is the location of their daughter's school. The young girl has 2years-old, the father 32 and the mother 34.

Despite the fact of all of them stated that they are satisfied with the current school, fathers were more reluctant on saying convincingly that they are satisfied. While both mothers affirmed their satisfaction and one of them even state that she is completely satisfied, both fathers ranked their satisfaction as medium high.

Both schools are private and described as relatively small. This fact, is unanimous considered by all of them, a plus concerning the number of kids but a minus when it means less space for exterior activities. Another unanimous disadvantage, regardless if it is woman or man, is the monthly fee paid. Additionally, innovation was also pointed out as an important issue, since it is an important feature for the children development.

### 3.4.2 Online Survey

As it was said previously, there are two versions of the online survey (Exhibit 6 and 7). The second version has some adjustment according to the input of the interviews realized.

The survey is quite similar to the interview but with closed answers in order to facilitate its accomplishment. This is one of the changes between version 1 and 2.

It was also added a question about the residence location in order to understand if people that do not have the same residence and school locations have different preferences. Besides, the first version did not considered the possibility of the child are not attending any school at this moment, however, these parents can also give a valuable contribute to this study since they are potential clients and thus their opinion about the presented technologies should be considered.

Another difference of the two versions is the pro and cons proposed on question 6 and 7, namely it was added the teaching and food quality and the innovation ratio.

Since the price is a major concern for parents and they are not really willing to add any extra cost to the monthly fee, some adjustment were done to the price echelons of each technology according to the answers collected.

# 4 Analysis

## 4.1 Data Analysis

This chapter contains the analysis of the data collected on the online survey and it is presented on exhibits 8, 9 and 10.

Initially, these data will be summarized to describe the sample of this study. Then, these results will be discussed in order to verify if the hypothesis announced previously are accepted

or rejected. This discussion will lead to intermediary conclusions and finally to the main conclusion, i.e., the answer to the main reach question of this thesis. In other words, in this chapter, it is possible to find which factors influence the technology preference and overall which ICT are considered valuable according to the sample inquired. After this, the valuable technologies are analyzed in order to see whether they can be considered sustainable or not.

### 4.1.1 Sample Description

As it was said previously, the first part of the survey conducted is related with demographic topics. In total, 113 parents answered this online survey, 21% fathers and 79% mothers, with ages between 20 and 55 years old being the most common the range with 26-31 and 32-37 years with 27% of respondents. The majority of the respondents have just one son (60%), followed by 30% with two sons and the remaining with 3 or more. Regarding the children ages, it was quite homogeneous, although, 30% have sons between 5 and 7 years old, 25% between 1 and 2, 24% with 3 or 4 years old and the remaining 21% with less than 1 year. (Exhibit 8 1, 2, 3 and 4)

Next, the respondents were asked about their residence location, which 12% live in Cascais, 11% in Lisboa (South Area), 11% Lisboa (North Area), 8% live in Porto and 6% in Aveiro. The remaining districts presented in the survey registered only few occurrences or even none. Regarding the school location, 11% answered Lisboa (South Area) , 11% Cascais, 9% Lisboa (North Area) and the remaining percentage is scattered by the other cities (Exhibit 8 5 and 6). Additionally, 24% of the parents declaired that their sons is not attending any school at the moment.

### 4.1.2 Opinion about the current school

The next set of questions done is related with the school, so obviously, parents that answered that “my son is not attending any school” were not inquired about this subject.

The first observation is that the majority of the respondents are satisfied or very satisfied with their son’s school (93% in total), being unanimous that the school’s best feature is the teaching quality (49%) followed by the relationship with the staff (19%). While the less enjoyed feature is the price (36%) followed by the lack of innovation with 12%. The last question of this section was their contact with technologies and 45% parents stated that they use the school’s website, while 26% declared not having contact with any kind of technology.

Given this last value and the fact that almost all parents inquired are satisfied with the school, it might suggest that technology is not essential for those parents' satisfaction. On the other hand, it is still possible that technology can increase their overall satisfaction.

Although, these results do not lead to any specific conclusion regarding the parents' preference and so no further analysis were done with this set of questions.

### 4.1.3 Opinion about the proposed technologies

#### *4.1.3.1 Interest*

This section is about parents' opinion about each technology. All the four technologies were considered interesting, being the Communication Platform (CP) the most interesting with 89% of the respondents saying that they would be interested in this technology, followed by GPS and Online Game both with 80% and lastly 65% answered that they would be interested in Homework Software.

#### *4.1.3.2 Influence on the decision making process*

Regarding the influence on the decision making process of the school, the Communication Platform is still on the first place with 79% of the sample saying that if they have two similar schools they would preferred the one that has this technology, while 73% said de same for GPS, 52% for Homework Platform and 50% for the Didactic Game.

#### *4.1.3.3 Willingness to pay*

After, respondents are asked about their willingness to pay and the respective amount of money (in Euros) they would pay for each technology. In fact, 55% are willing to pay for GPS, 48% for CP, 29% for the Game and 27% for the Homework Software (Exhibit 8 13, 14, 17, 18, 21, 22, 25 and 26). As it is expected, the average amount they were willing to pay follows almost the same order with 6,20€/per usage for GPS, 4,64€/month for Communication Platform, 2,86€/month for Homework Platform and 2,07€/month for Didactic Game. (Exhibit 10, 6)

#### *4.1.3.4 Ranking*

Ultimately, parents were asked to rank the four technologies according to their preference and, as it can be seen in Exhibit 8.27, 42% chose Communication Platform in the first place,

next the GPS Bracelet (38%), 12% chose the Online Didactic Game and the remaining 8% de Homework Software. These results lead to the conclusion that CP and GPS Bracelet are the most appreciated technologies by those parents, not only based on the rank, where Homework Software and Didactic Game were far behind, but also based on the willingness to pay and the actual amount in Euros.

### 4.1.4 Hypothesis Analysis

In order to answer the hypotheses assumed earlier, a deeper analysis is conducted, with pivot tables to see if any of the demographic characteristics have impact on the technologies preference.

#### *4.1.4.1 Hypothesis 1*

First, four pivot tables are done considering the parameter Age (Exhibit 9, 2). Regarding GPS, it can be assumed that there is a tendency for younger people to prefer this technology, as it can be seen on Table 1, 89% of the respondents that elected this application are between 20 and 37 years-old and no one of the last echelon chose GPS as first choice in the rank. This might be explained by the fact that younger people are more open to this kind of innovative technologies, while older people can see this bracelet as a negative object.

The Communication Platform is quite similar. The 86% of the parents inquired that put this technology in the first place are between 26 and 43 years old (table 2).

In relation to Homework Software (table 3), there is a slightly adherence of the group 37-43 years old however it is difficult to say precisely given the small number of people that chose this Software in the first place (9 respondents) which are almost equally spread over the 5 echelons of ages.

In the table 4 of the same Exhibit, it can be observed a similar situation with only 14 respondents choosing the Didactic Game as their favorite. Although, here, there is a little bias on the two older segments since they sum up an adherence of 65%.

Summarizing, it is only possible to perceive a trend in the GPS Bracelet and the Communication Platform which is the segment between 20-37 years and 26-43 years respectively and thus **H1 is rejected.**

#### *4.1.4.2 Hypothesis 2*

The next group of four tablets shows the technologies preference according to gender (Exhibit 9.3). Despite the sample is slightly biased, having more female respondents, which makes

more difficult to take more accurate conclusions, there is a clear adhesion from the female side concerning GPS (91%) and the Communication Platform (79%).

The other two technologies are more balanced, with Homework Software being preferred by 33% of men and the Didactic Game by 43%. Despite being in absolute value inferior to Communication Platform it can be observed an affinity between men and the Online Game. This fact is not surprising given that men spend more time in this kind of entertainment than women.

So, it can be stated that female prefer the GPS Bracelet and the CP and men the Online Game, while the data of Homework Software is not conclusive enough to take accurate illations. Hence, **H2 is rejected**.

#### *4.1.4.3 Hypothesis 3*

Concerning the number of sons (Exhibit 9), the parents that have just one son prefer GPS and Communication Platform while the only respondent that has four or more children chose the Homework Software as his preferred technology. The Online Game is desired by parents of just one son and two sons, however, in absolute terms the value is lower than their interest on GPS and CP. In other words, **H3 are rejected.**

#### *4.1.4.4 Hypothesis 4*

In relation to hypothesis 4 that tries to understand if there is a relationship between the son's age and the technologies preference, the pivot tables present on Exhibit 9 lead to the conclusion that the respondents with children aged between 1 and 4 are only attracted to GPS Bracelet and Communication Platform. The Homework Software does not have any clear preference as well as the Didactic Game that is slightly preferred by the group with kids between 5 and 7 years old however in absolute terms it can be seen that those parents actual like more the GPS and the Communication Platform. And so, again, **H4 is rejected**.

#### *4.1.4.5 Hypothesis 5*

Hypothesis 5 suggests that the location of residence might have impact on such preference. However, by observing Exhibit 9, such relationship does not exist since there is no clear link between any specific city and any of the technologies proposed. Thus, **H5 is rejected.**

#### *4.1.4.6 Hypothesis 6*

A similar scenario is observed on Hypothesis 5 that says that the school location has impact on the technologies preference, but none of the districts presented shows a relevant inclination to any technology (Exhibit 9.7). Meaning that, **H6 is also rejected**.

#### *4.1.4.7 Value Creation – Hypothesis 7, 8, 9 and10*

Last but not least, the four last hypotheses that try to understand if each one of the technologies have value to these parents, give their willingness to pay and the impact on the decision making process of the school.
Accordingly, **H7** ("GPS Bracelet has value to parents") and **H8** ("Communication Platform has value to parents") can be **accepted** given the respondents' adherence, not only the in terms of the interest demonstrated (89% and 81% respectively), but also because 79% and 73% claim that these technologies would influence their school choice and the fact that those parents would be willing to pay 6,20€ and 4,64€.

On the other hand, Homework software and Didactic Game did not have the same level of adhesion. With Homework Software interesting to 65% of the parents inquired, influencing 52% in their school choice and summing up an average amount of 2,86€/month, it can be said that this Information and Communication Technology is not really valuable for those parents and thus **H9** ("Homework Software is valuable to parents") **is rejected**. At the same time, Online Didactic Game attract 80% of the respondents, but only 50% say that it will affect their decision making process and in addition in average respondents would willing to pay only 2,07€ per month to have access to this service. This means that, comparing to GPS and Communication Platform, this technology is not so valuable and, consequently, **H10** ("Online Didactic Game is valuable to parents") **is rejected** as well.

In conclusion, and summarizing all pivot tables, the respondents' age allowed reaching some conclusion, the group between 20 and 37 years likes GPS, parents between 26 and 43 like Communication Platform, older people (37-55 years) like Online Game and there is no clear

illation for Homework Software. Thus, since it is not possible to define every echelon preference, and so H1 is rejected. The Gender, apart from the bias observed, it is possible to notice a tendency for women to like GPS and CP. However, because the men's preference is not totally clear H2 is rejected too. Regarding the number of sons, parents with just one kid, clearly like more GPS and CP and parents with two kids tend to like the Communication Platform. Given the same problem with parent's age, H3 is also rejected. Lastly, pivot tables concerning the sons' age are not conclusive given the fact that in absolute terms all parents prefer GPS and CP, i.e. H4 is rejected. Additionally, it was noted that there is no clear relation between the location of residence and the technologies preference (H5 is rejected). As well as the location of the school also does not related to any preference in particular and so H6 is also rejected.

In concern to the perceived value of each technology it is concluded that the two truly valuable technological services are the GPS Bracelet and the Communication Platform and thus H7 and H8 are accepted while the lack of adhesion to Homework Software and Didactic Game induced to reject H9 and H10.

### 4.1.5 Sample segmentation

Despite not being part of the hypotheses referred above it was considered interesting to do segmentation to see a pattern of the parents that chose each technology in the first place of the rank. The first profile presented is the parents whose children do not attend any kindergarten, followed by the parents that picked GPS as their preferred technology, the third segment is the parents who chose CP, the fourth fans of Homework Software and the last segment is the respondents that elected Online Game as their favorite.

#### *4.1.5.1 Segment of parents who do not have their sons in school*

The first profile analyzed is the parents who do not have their sons in school. As it can be seen on Exhibit 10, this group is almost only composed by women (89%), with only one son (70%) who is especially interested in GPS Bracelet (96%) and even is willing to pay a significative amount for it (11,09€). Those parents are also substantially interested in CP (85%) but not so disposed to pay for it (48%). Homework Software and Online Game do not arouse interest to this segment. This perceived value of both GPS and Communication Platform may suggest that

this population have a great concern about their sons' safety and wellbeing and thus have the need of being aware about every activity their sons do in real time.

#### *4.1.5.2 GPS Bracelet fans*

The people that chose GPS in the first place are female (91%), with a slight tendency to be young (49% of the respondents are between 20 and 31 years), with just one son (72%), that, not surprisingly, are disposed to pay for this technology however the average amount is lower than what the last segment is willing to pay (9,42€ vs 11,09€). They are also very interested on Communication Platform (88%) but, again, they would be not very happy to pay for it (47% are willing to pay). There is also some interest in the Online Didactic Game but not enough to give money for it.

#### *4.1.5.3 Communication Platform fans*

According to Exhibit 10, The Communication Platform fans are mostly female but not so massively (78%) relatively older than the last two segments, with ages between 32 and 43 years old (60%). They are attracted also to GPS (78%) but not to the Homework Software and Didactic Game which do not even influence the school choice. This group is willing to pay 8,65€ per month to use this service.

#### *4.1.5.4 Homework Platform fans*

The respondents that prefer the Homework Platform are a slightly more homogeneous with just 67% of women with children under 1 year-old (44%). One curious detail is that 100% refused to pay for GPS and CP however some admit the possibility of paying for Didactic Game (56%). Although, this segment stated being interested to all the technologies presented. Another aspect that could be interesting to notice is the amount that these parents are willing to pay for their favorite technology: 9,78€ which a high amount for a segment that are not willing to pay for the other technologies (Exhibit 10).

#### *4.1.5.5 Online Didactic Game fans*

Lastly, follows the characteristics of the sample that prefers Online Didactic Game. This is the most homogeneous group with 57% of women with older sons (between 5-7 years). This is a particular group because they do not seem very interested in any technology, not even in their

favorite. 86% affirms being interested in such technology, 50% admits that it can influence their decision making process and in average they are willing to pay an amount of 4,75€ per month. Therefore, respondents affirmed not being ready to pay for any of the technologies, namely, 100% do not agree on paying for Homework. Additionally, any technology would affect their decision making process when choosing a school for their son. Obviously, this is less visible in concerning their preferred option.

### 4.1.6 RBV Analysis

Based on the analysis above that allowed perceiving which technologies are the most valued by consumers, a sustainability analysis according to RBV theory follows. In other words, after verifying the perceived value of each of the four technologies proposed, we analyze whether they are also rare, inimitable and non-substitutable or not and, hence, if they can be considered sustainable core competences.

Regarding Homework Software and Didactic Game, given their weak adherence it can be concluded that these two technologies do not have a relevant value for the majority of the respondents, thus, there is no need to proceed with this analysis since they already fail one of the evaluation criteria. Meaning that, if it is not appreciated and do not have a significant value for consumers so they cannot be considered core competences.

On the other hand, the GPS, the technology with the highest amount the sample are willing to pay, can be considered valuable given the fact that 81% claimed to be interested in this technology, additionally 73% stated that they would prefer a school that offers this service and the average amount that this sample are willing to pay is 6,20€.
Once valuable, it is necessary to evaluate if it can fulfill the remaining criteria.
Even though, there are other devices, for instance smartphones, that offer apps which have a similar functionality, to our knowledge, there is no school in Portugal that offers a GPS bracelet. In this sense, GPS Bracelet can be considered rare as well.
In relation to the criterion inimitable, there are two points of view. First, if the kindergarten only uses this bracelet to warn unexpected situations when a child disappears then it is definitely imitable. On the other hand, if the school takes advantage of this device preventing these situations, by knowing the kids' patterns and which children need more surveillance, this knowledge it is not easily imitable. In other words, with the GPS bracelet teachers can

anticipate the children's behavior and know who needs more attention because it is more probable to move away from the group. With a historical of behaviors, the school can delineate a pattern of each child, which can be shared with the parents in order to justified the utilization the need of this service or not. As a result, parents will feel much more comfortable and relaxed when their son leaves the school on outside activities. This personalized service makes this technology not so easily imitable and substitutable.

Besides the explanation presented above, this technology does not have substitutes nowadays. For instance, the majority of the schools use objects like, hats, clothes, plastic necklaces or bracelets to identify and localize kids when they have outside activities or trips. Obviously, these objects do not provide the same functionality than GPS Bracelets since they do not transmit the kid's location which can be monitored on a website or give any alert in case of he/she leaves the supposed area. In addition, Smartphone could be considered a substitute as well. However, these children are too young to carry this kind of device not only because is too expensive but also because it is not so convenient and easily portable as the GPS Bracelet. In this sense, it can be concluded that there is no equivalent substitutes for this technology.

Last but not least, we analyse the preferred technology, Communication Platform, regarding its strategic potential. With 89% saying that they would be interested on it, 79% declaring that they would prefer a school that provides this service and also 4,64€ as average amount that respondents are willing to pay per month for it, it can be stated that this technology is considered valuable.

Platforms for parents are something that some schools already offer. However, its rareness will depend on how the school uses it and the complexity of such platforms. Usually, these parents' platforms are only used to share information about the week meals or some punctual event, i.e., there is no personalization, no specific information and no privacy, every parent receives the same information. This fact hampers the sharing of more private contents that parents might not like to be seen by others. This means that if Communication Platform provides detailed information about the everyday activities, wellbeing and other information and at the same time guarantee the privacy of every of these posts, it will differentiate from the other parents' platforms available nowadays and thus it can be considered rare.

Besides of providing all that information that parents might want to know in a way that safes theirs and their son's privacy, this technology also has a great value to the teacher since they can register all the activities and behaviors of the children they are responsible for as well as

share messages with the parents which allow the teacher to be more prepared and to do a better monitoring. This constant exchange of information may also help to create a relationship between parents and the teacher as well as parents with their sons since they are now more aware of his/her daily activities. For all these reasons, this is a technology that is no easily imitable and without substitutes.

Summarizing, GPS bracelet can be a sustainable competitive advantage because besides de fact it does not have any similar or equivalent technology operating in Portugal, in the long term schools can maintain this advantage by using this service for designing behaviors patterns for each child in order to help teach to be better prepared for the outside activities and to share that information with parents as well. Hence, it can be considered valuable, rare, not easily imitable and non-substitutable. Regarding Communication Platform, in order to became a sustainable competitive advantage it has to improve the relationship between school/teachers and the parents, by providing important information such as (diseases, daily activities, photos and videos etc.) which at the same time will enhance the relationship between the child and the parents and help the teacher to better monitor each kid.

# 5 Final Conclusion

Based on this analysis and discussion on the previous sections, this chapter aims to summarize all of those topics leading to the final conclusion that answers the main research question of this thesis: Is it possible to create value to kindergartens and preschools through the implementation of information and communication technologies? Can kindergartens and preschools use this value as sustainable competitive advantage?

To answer this question some hypotheses were raised. The first six hypotheses aim to understand and link the traits of parents and their preferred technology

Firstly, concerning H1, H2, H3, H4, H5 and H6, where it was tested which population characteristics are correlated with the technologies preferences, it comes to the conclusion that there is only link between certain characteristics and their preferences. Hence, the group between 20 and 37 years like GPS, the parents between 26 and 43 like Communication Platform, older people (37-55 years) like Online Game and there is no clear illation for Homework Software. The Gender, apart from the bias, also allowed noticing a tendency for

women to like GPS and CP and men have a possible trend to the online Game. Regarding the number of sons, parents with just one kid, clearly like more GPS and CP and parents of two kids tend to like the Communication Platform. The remaining options do not show any pattern with the preferences.

Regarding H7, H8, H9 and H10, which analyzed the perceived value of each technology, it led to the conclusion that only GPS Bracelet and Communication Platform are truly valuable to the sample, being the Communication Platform the elected as the preferred technology and GPS as the technology which parents are willing to pay a higher price (6,20€/usage).

After verifying the creation of value of each technology, a RBV analysis was done. Since, Homework Software and Online Game do not create a significant valuable for the sample, this analysis do not apply. Whereas, the other two technologies are considered valuable, rare, not easily imitable and without substitutes. GPS can be considered sustainable competitive advantages for kindergartens and preschools if it is used to define behaviors patterns of the children and manage educator's attention when need it according to that information. As Communication Platform can be a sustainable competitive advantage if it is used as a way to increase teachers and parents relationship, by providing useful information to parents and allow them to interact and to help their son when he needs and to teacher in order to personalized their attention to each child.

**So the answer to "Is it possible to create value to kindergartens and preschools through the implementation of information and communication technologies? Can kindergartens and preschools use this value as sustainable competitive advantage?" is Yes. In fact, some technologies can create value to parents and depending on how they are used by the school it can became a sustainable competitive advantage.**

### 5.1.1 Limitations and Future Research

Even though, the main research question of this thesis has been answered there are some limitations and future research that could be studied.

One clear limitation of this dissertation was the sample. An ideal scenario would be all the echelons in the 6 first questions have the same number of people. So for example, each age range should have the same number of responses in order to allow the observation of a pattern for each one. The same for gender, residence location, school location, number of sons and son's age.

Moreover, a possible future research could be the reasons for each segment to choose that particular technology as their favorite. Hence, it would be possible to understand which feature the technology fans like the most or like the least and the same for the non-fans. By doing this would be easier to attract more parents and maximize their satisfaction.

Lastly, another interesting study could be to understand what kind of ICT influence parents to put their sons in school. This study is related with the big group of group of children who do not attend any school, verified in this thesis. Thus, it might be interesting to find out what could change those parents' minds and make them trust

# 6 References


- Amante, L. (2003). A Integração das Novas Tecnologias no Pré-Escolar: Um Estudo de Caso. Dissertação de Doutoramento em Ciências da Educação. Lisboa: Universidade Aberta.
- Amante, L. (2004b). As Tecnologias da informação e da Comunicação na Educação Pré‐Escolar: excertos de um percurso. Escola Moderna, 25, mEm, pp. 5‐36.
- Amante, L. (2007). As TIC na Escola e no Jardim de Infância: motivos e factores para a sua integração. Universidade Aberta
- Aldhmour, F. M. & Shannak, R. (2009). The Effective Utilization of Information and Communication Technology and its Impact on Competitive Advantage. European Journal of Scientific Research. Department of MIS, Faculty of Business, University of Jordan, pp.302-314
- Barney, J. (1991). Firms, Resources and Sustained Competitive Advantage. Journal of Management, 17 (1), 99-120
- Brito, R. (2010). As TIC em educação pré-escolar portuguesa: atitudes, meios e práticas de educadores e crianças. Instituto de Educação da Universidade do Minho.
- Carr, N. (2003). IT Doesn't Matter. Harvard Business Review. r0305b
- Christie, B. (1985). Human factors and information technology in the office. New York: Wiley.
- Clements, D. H. & Nastasi, B. K. (2002). Os meios Electrónicos de Comunicação e a Educação de Infância. In B. Spodek (org.), Manual de Investigação em Educação de Infância. Lisboa: fundação Calouste Gulbenkian, pp. 561‐619.
- Clements, D. H. & Swaminathan, s. (1995). Technology and school Change: new Lamps for old? Childhood Education, 71, pp. 275‐281.
- Coll, C. (1992). Un marco de Referencia Psicológico para la Educación Escolar: La Concepción Constructivista del Aprendizaje y de la Enseñanza. In C. Coll; J. Palacios & A. Marchesi (comps.), Desarrollo Psicológico y Educación, II, Psicología de la Educación. Madrid: Alianza Editorial, pp. 435‐453.
- Cotrim, D. L. (2007). O Computador como Recurso numa Escola Isolada do Alentejo. Dissertação de mestrado em Ciências da Educação. Lisboa: Universidade Católica.
- Daft, R. 1983. Organization theory and design. New York; West
- Davidson, J. & Wright, J. L. (1994). The potential of the microcomputer in the early childhood classroom. In J. L. Wright & D. D. Shade eds.), Young Children: Active Learning in a Technological Age. Washington, DC: national Association for the Education of the Young Children, pp. 77‐91.
- Drogas, A. P. (2007). A Aprendizagem Cooperativa e as Novas Tecnologias. Uma Investigação-Acção no 1º Ciclo do Ensino Básico. Dissertacao de Mestrado em Ciencias da Educacao. Lisboa:Universidade Catolica.
- Grácio, s. (2002). Reflexões sobre as novas tecnologias e a educação. Revista Portuguesa de Investigação Educacional, 1, pp. 5‐22.

- Huang, Z., & Pavia , P. (2001). ERP Implementation Issues in Advanced and Developing Countries. Business Process Management Journal, 7(3), 276- 284.
- Haugland, S. W. (2002). Computers in the Early Childhood Classroom. Earlychildhood.com. The Professional Resource for Teachers and Parents.
- Haugland, S. W & Wright, J. L. (1997). Young Children and Technology - A World of Discovery. Boston: Allyn and Bacon.
- Hayes, R.H. && Wheelwright, S. 1984. Restoring our competitive edge. New York; Wiley.
- Hirshliefer, J. (1980). Price theory and applications (2nd ed.). Englewood Cliffs, Nj: Prentice-Hall.
- Lippman, S., & Rumelt, R. 1982. Uncertain imitability; An analysis of interfirm differences in efficiency under competition. Bell Journal of economics. 13:418-438.
- Jonassen, H. D.; Howland, J.; Moore, J. & Marra, m. (2003). Learning to Solve Problems with Technology. A Constructivist Perspective. New Jersey: Merrill Prentice Hall.
- Lefever‐Davis, s. & Peraman, C. (2005). Early readers and electronic texts: CD‐Rom storybook features that influence reading behaviors. The Reading Teacher, 58, 5, pp. 446‐454
- Lewin, C. (2000). Exploring the effects of talking book software in UK primary classrooms. Journal in Research in Reading, 23, 2, pp. 149‐171.
- Li-Hua, R. A & Khalil, T. P. (2006) Technology Management in China: A Global Perspective and Challenging Issues. Journal of Technology Management in China, 1(1), 9-26.
- Little, W., Fowler, H. W. & Coulson, J. (1965). Oxford dictionary illustrated
- Miranda, G. (2006), As novas tecnologias e a inovação das práticas pedagógicas. Contextos de aprendizagem para uma sociedade do conhecimento. Associação Nacional de Professores
- NAEYC (1996). Position Statement: Technology and Young Children. Ages 3 through 8. Washington, D.C.: national Association for the Education of Young Children.
- Obercom. (2005/2006) Sectores da Comunicação. Tecnologias de Informação e comunicação. http://www.obercom.pt/client/?newsId=16&fileName=anuario_05_06_tic.pdf
- Oliveira‐Formosinho & J. Formosinho, J. (2001). Associação Criança: Uma Comunidade de Apoio ao Desenvolvimento sustentado na Educação de Infância. In J. Oliveira‐Formosinho & J. Formosinho (orgs.), Associação Criança: Um Contexto de Formação em contexto. Braga: Livraria Minho, pp. 27‐61.
- Paiva, J. (2002). As tecnologias de informação e comunicação: utilização pelos professores, Lisboa; ME/DPA
- Perrenoud, P. (1994). A organização, a Eficácia e a mudança, realidades construídas pelos actores. In m. g. Thurler & P. Perrenoud, A Escola e a Mudança. Lisboa: Escolar Editora, pp. 112‐131.
- Pierce, P. L. (1994). Technology integration into early childhood curricula: Where we've been, where we are, where we should go. Research synthesis on early intervention practices

- Ponte, J. P. (2002). As TIC no início da escolaridade – Perspectivas para a formação inicial de professores. In J. P. Ponte (org.), A Formação para a Integração da TIC na Educação Pré-Escolar e no 1º Ciclo do Ensino Básico. Porto: Porto Editora, pp. 1926.
- Portaria n.º 262/201; Diário da República, 1.ª série — N.º 167 — 31 de Agosto de 2011
- Porter, M. (1981). The contributions of industrial organization to strategic management. Academy of Management Review, 6:609-620.
- Porter, M. & Millar, V. (1985). How information gives you competitive advantage: the information revolution is transforming the nature of competition. Harvard Business Review
- Rada, J. (2004). Oportunidades e riscos das novas tecnologias para a educação. In J. Tedesco (ed.), Educação e novas tecnologias: esperança ou incerteza? Unesco: Cortez Editora, pp. 109-119.
- Ray, G. & Muhanna, W. & Barney, J. (2005). Information technology and the performance of the customer service process: a Resource Based Analysis. MIS Quarterly.
- Schaff, A. (1990). A Sociedade Informática. São Paulo: Unesp
- Silva, A. (2004). Professores utilizadores das TIC em contexto educativo: estudo de caso numa escola secundária. Dissertação de mestrado. Lisboa: Faculdade de Psicologia e Ciências das educação.
- Silva, F. (2003). Tecnologias e formação inicial de professores: um estudo de opiniões e práticas. Dissertação de mestrado. Lisboa: Faculdade de Psicologia e de Ciencias da Educação.
- Siraj-Blatchford, J. & Whitebread, D. (2003). Supporting Information and Communications Technology in the Early Years. Glasgow: open University Press.
- Thurler, M. G. (1994). Levar os professores a uma construção activa da mudança. Para uma nova concepção da gestão da inovação. In M. G. Thurler & P. Perrenoud (orgs.). A Escola e a Mudança. Lisboa: Escolar Editora, pp. 33-59.
- UNDP. 2001, Theses of Lessons Learned, essentials, DoT Force 2001 NO4 July S/N.

# EXHIBITS

## Exhibit 1 - Parents Interview

1. Age:
2. Gender:
3. Location of residence:
4. Number of sons:
5. How old are your son/sons?
6. Location of his/her/their school:
7. How do you evaluate his/her school?
8. What are the two best and the two worst features of your son's school?
9. What would you like to see in that school?
10. Do you or your son have any contact with information technologies? Such as school's website, a specific online platform for parents, computer classes, etc?
11. What do you think if the school provided a GPS bracelet that will allow you to control anytime your son's position through a website and that alerts you by email or sms in the case your son leaves the school?
12. Are you willing to pay more to have this service? How much?
13. Imagine now an online platform that facilitates the communication between parents and the teacher. The educator can post every event related with your son in a daily basis with comments, videos or pictures and you would be able to check it online or in a daily report sent to your email in the end of the day. What do you think about this service?
14. Are you willing to pay more to have this service? How much?
15. Picture now a software for your son do his homework. The content of the homework would be similar to the current homework but more interactive, visually motivating and it would stimulate more his creativity developing his hard and soft skills. In addition, the software would send his homework to the teacher by the time he finishes it and thus your son can the better monitored latter on. What do you think about it?
16. Are you willing to pay more to have this service? How much?
17. Finally, what do you think if your son's school developed an online didactic game with different levels according to the children's ages that will allow your son to play with their classmates promoting their interactions while he learns the class contents?
18. Are you willing to pay more to have this service? How much?
19. Rank the four technologies by preference.
20. Do you have any other technology that you would like to find in your son's school?
21. Any additional comment?

## Exhibit 2 - Interview I

1. Age: 34
2. Gender: Female
3. Location of residence: Odivelas
4. Number of sons: 1
5. How old are your son/sons? 2
6. Location of their school: Odivelas
7. How do you evaluate their school? Very Satisfied
8. What are the two best and the two worst features of your son's school?
   + Good educational project
   + Familiar environment
   - Price
   - Few outside activities/small space available

9. What would you like to see in that school?
   More exterior activities

10. Do you or your son have any contact with information technologies? Such as school's website, a specific online platform for parents, computer classes, etc?
    Website, online menu schedule, computer classes

11. What do you think if the school provided a GPS bracelet that will allow you to control anytime your son's position through a website and that alerts you by email or sms in the case your son leaves the school?
    Yes
12. Are you willing to pay more to have this service? How much?
    Yes, max 5€

13. Imagine now an online platform that facilitates the communication between parents and the teacher. The educator can post every event related with your son in a daily basis with comments, videos or pictures and you would be able to check it online or in a daily report sent to your email in the end of the day. What do you think about this service?
    No. Good relationship with educator. No need
14. Are you willing to pay more to have this service? How much?
    No
15. Picture now a software for your son do his homework. The content of the homework would be similar to the current homework but more interactive, visually motivating and it would

stimulate more his creativity developing his hard and soft skills. In addition, the software would send his homework to the teacher by the time he finishes it and thus your son can the better monitored latter on. What do you think about it?

Yes

16. Are you willing to pay more to have this service? How much?

    No, school's obligation

17. Finally, what do you think if your son's school developed an online didactic game with different levels according to the children's ages that will allow your son to play with their classmates promoting their interactions while he learns the class contents?

    Yes, but not too much

18. Are you willing to pay more to have this service? How much?

    Max 5€

19. Rank the four technologies by preference.

    1º GPS

    2º Homework platform

    3º Game

    4º Communication Platform

20. Any additional comment?

## Exhibit 3 - Interview II

1. Age: 32
2. Gender: male
3. Location of residence: Odivelas
4. Number of sons: 1
5. How old are your son/sons? 2
6. Location of their school: Odivelas
7. How do you evaluate their school? Satisfied
8. What are the two best and the two worst features of your son's school?

    + Location

    + familiar environment

    - price

    - heterogeneous professionalism

9. What would you like to see in that school?

    ----

10. Do you or your son have any contact with information technologies? Such as school's website, a specific online platform for parents, computer classes, etc?

    Website, online menu schedule, computer classes, Gymboree

11. What do you think if the school provided a GPS bracelet that will allow you to control anytime your son's position through a website and that alerts you by email or sms in the case your son leaves the school?
    Yes but only to Study trips
12. Are you willing to pay more to have this service? How much?
    Yes, 20-30€

13. Imagine now an online platform that facilitates the communication between parents and the teacher. The educator can post every event related with your son in a daily basis with comments, videos or pictures and you would be able to check it online or in a daily report sent to your email in the end of the day. What do you think about this service?
    Yes, but the school already uses webcam in the classroom sometimes. Maybe it would be too difficult to implement, educator may lose too much time with it.
14. Are you willing to pay more to have this service? How much?
    Yes, 5-10€
15. Picture now a software for your son do his homework. The content of the homework would be similar to the current homework but more interactive, visually motivating and it would stimulate more his creativity developing his hard and soft skills. In addition, the software would send his homework to the teacher by the time he finishes it and thus your son can the better monitored latter on. What do you think about it?
    Yes
16. Are you willing to pay more to have this service? How much?
    Maybe but more important to children older than 6 years old
17. Finally, what do you think if your son's school developed an online didactic game with different levels according to the children's ages that will allow your son to play with their classmates promoting their interactions while he learns the class contents?
    Yes, it is important to the children's development
18. Are you willing to pay more to have this service? How much?
    No because they already use Gymboree
19. Rank the four technologies by preference.
    1º Communication Platform
    2º Homework platform
    3º GPS
    4º Game
20. Any additional comment?

## Exhibit 4 - Interview III

1. Age: 45
2. Gender: Male
3. Location of residence: Cascais
4. Number of sons: 2
5. How old are your son/sons? 5 e 8
6. Location of their school: Cascais
7. How do you evaluate their school? Satisfied (4 out 5)
8. What are the two best and the two worst features of your son's school?
   + good relationship between students and teachers
   + Diversified and adapted to the reality activities
   - price
   - too many students

9. What would you like to see in that school?
   Pool inside the school

10. Do you or your son have any contact with information technologies? Such as school's website, a specific online platform for parents, computer classes, etc?
    Monthly Newsletter, no website, online game (pinguim), weak computer classes

11. What do you think if the school provided a GPS bracelet that will allow you to control anytime your son's position through a website and that alerts you by email or sms in the case your son leaves the school?
    No
12. Are you willing to pay more to have this service? How much?
    No

13. Imagine now an online platform that facilitates the communication between parents and the teacher. The educator can post every event related with your son in a daily basis with comments, videos or pictures and you would be able to check it online or in a daily report sent to your email in the end of the day. What do you think about this service?
    Yes
14. Are you willing to pay more to have this service? How much?
    No, school's obligation
15. Picture now a software for your son do his homework. The content of the homework would be similar to the current homework but more interactive, visually motivating and it would

stimulate more his creativity developing his hard and soft skills. In addition, the software would send his homework to the teacher by the time he finishes it and thus your son can the better monitored latter on. What do you think about it?

Yes

16. Are you willing to pay more to have this service? How much?

    No

17. Finally, what do you think if your son's school developed an online didactic game with different levels according to the children's ages that will allow your son to play with their classmates promoting their interactions while he learns the class contents?

    Yes

18. Are you willing to pay more to have this service? How much?

    Max 20€

19. Rank the four technologies by preference.

    1º Game

    2º Homework platform

    3º Communication Platform

    4º GPS

20. Do you have any other technology that you would like to find in your son's school?
21. Any additional comment?

## Exhibit 5 - Interview IV

1. Age: 42
2. Gender: Female
3. Location of residence: Cascais
4. Number of sons: 2
5. How old are your son/sons? 5 e 8
6. Location of their school: Cascais
7. How do you evaluate their school? Satisfied (4 out 5)
8. What are the two best and the two worst features of your son's school?

    + small and familiar environment

    + demanding but not too much

    - price

    - too many students

9. What would you like to see in that school?

    More innovation, different food, more art/creativity activities

10. Do you or your son have any contact with information technologies? Such as school's website, a specific online platform for parents, computer classes, etc?

    Monthly Newsletter, no website, online game (pinguim), weak computer classes

11. What do you think if the school provided a GPS bracelet that will allow you to control anytime your son's position through a website and that alerts you by email or sms in the case your son leaves the school?

    Yes
12. Are you willing to pay more to have this service? How much? No
13. Imagine now an online platform that facilitates the communication between parents and the teacher. The educator can post every event related with your son in a daily basis with comments, videos or pictures and you would be able to check it online or in a daily report sent to your email in the end of the day. What do you think about this service?

    Yes
14. Are you willing to pay more to have this service? How much?

    Max 20€
15. Picture now a software for your son do his homework. The content of the homework would be similar to the current homework but more interactive, visually motivating and it would stimulate more his creativity developing his hard and soft skills. In addition, the software would send his homework to the teacher by the time he finishes it and thus your son can the better monitored latter on. What do you think about it?

    No because young children need to practice handwriting
16. Are you willing to pay more to have this service? How much?

    No
17. Finally, what do you think if your son's school developed an online didactic game with different levels according to the children's ages that will allow your son to play with their classmates promoting their interactions while he learns the class contents?

    Yes
18. Are you willing to pay more to have this service? How much?

    No
19. Rank the four technologies by preference.

    1º Communication Platform

    2º GPS

    3º Homework platform

    4º Game

20. Any additional comment?

    It was good if the communication platform synchronize the schools events in the Gmail/outlook calendar

## Exhibit 6 - Survey to Parents- 1st Version

1. Age: ____

2. Gender:

   Male

   Female

3. Number of sons: _____

4. Location of the school: _____

5. How do you evaluate his school?

   Very Unsatisfactory

   Unsatisfactory

   Neutral

   Satisfactory

   Very Satisfactory

6. Please identify the best feature of your son's school.

   Relationship With Staff

   Friendly Staff

   Professional Staff

   Extra Activities

   Price

   Management

   Good Facilities

   Other

7. Please identify the worst feature of your son's school.

   Relationship With Staff

   Unfriendly Staff

   Unprofessional Staff

   Extra Activities

   Price

   Management

   Bad Facilities

   Other

8. Which technologies your son or you have contact with in the school context?

   Neither my son nor I have contact with any kind of technology

School's website

Specific online platform for parents

Specific online platform for children

Computer classes

Electronic board

Other:

9. If your son's school provided a GPS Bracelet that would allow you to see wherever he is and that have the functionality of sending you an alert in the case he got out the expected area. Would you be interested in this service?

   Yes

   No

10. In the case of one of two similar schools provides this service, would you choose this school because of that?

    Yes

    No

11. Are you willing to pay more to have this service?

    Yes

    No

12. How much per each utilization? ( If you answered "No" above please answer 0)

    >5€

    6-11€

    12-19€

    20-29€

    30-49€

    50-79€

    80-100€

    >100€

13. Imagine now an online platform that facilitates the communication between the teacher and parents, where the first one can post comments, photos and videos about your son's activities, behaviors, achievements, diseases, alimentation, etc, but this information would be only available to the respective parent in order to have the

maximum privacy possible. You can have access to this information both through an online platform or a daily report on your email. Are you interested in this service?

Yes

No

14. In the case of one of two similar schools provides this service, would you choose this school because of that?

Yes

No

15. Are you willing to pay more to have this service?

Yes

No

16. How much per month? ( If you answered "No" above please answer 0)

>5€

6-11€

12-19€

20-29€

30-49€

50-79€

80-100€

>100€

17. Now picture a software that would allow your son to do his homeworks in a funnier and more engaging way. The content of this homework would be similar to the traditional one but would be design in order to develop other complementary skills. After finishing the homework it would be sent to the teacher so the feedback give later on can be improved. Would you be interested in this service?

Yes

No

18. In the case of one of two similar schools provides this service, would you choose this school because of that?

Yes

No

19. Are you willing to pay more to have this service?

Yes

No

20. How much per month? ( If you answered "No" above please answer 0)

>5€

6-11€

12-19€

20-29€

30-49€

50-79€

80-100€

>100€

21. Last but not least, if your son's school developed an online game, highly educational but at the same time very entertaining with the possibility of playing online with his classmates, would you like to have this service?

Yes

No

22. In the case of one of two similar schools provides this service, would you choose this school because of that?

Yes

No

23. Are you willing to pay more to have this service?

Yes

No

24. How much per month? ( If you answered "No" above please answer 0)

>5€

6-11€

12-19€

20-29€

30-49€

50-79€

80-100€

>100€

25. Rank the four technologies by preference.

__GPS Bracelet

__ Communication Platform

__Homework software

__Didactic online game

## Exhibit 7 - Survey II- improved version

1. Age:

   20-25

   26-31

   32-37

   37-43

   44-55

2. Gender:

   Male

   Female

3. Number of sons:

   1

   2

   3

   4 or +

4. Location of Residence:

Lisboa (ZONA SUL)

Lisboa (ZONA NORTE)

Almada

Alfragide

Amadora

Odivelas

Queluz

Loures

Mafra

Cascais

Oeiras

Sintra

Vila Franca de Xira

Aveiro

Beja

Braga

Bragança

Castelo Branco

Coimbra

Évora

Faro

Guarda

Leiria

Portalegre

Porto

Santarém

Setúbal

Viana do Castelo

Vila Real

Viseu

5. Location of the school:

Lisboa (ZONA SUL)

Lisboa (ZONA NORTE)

Almada

Alfragide

Amadora

Odivelas

Queluz

Loures

Mafra

Cascais

Oeiras

Sintra

Vila Franca de Xira

Aveiro

Beja

Braga

Bragança

Castelo Branco

Coimbra

Évora

Faro

Guarda

Leiria

Portalegre

Porto

Santarém

Setúbal

Viana do Castelo

Vila Real

Viseu

Not attending any school

6. How do you evaluate his school?

   Very Unsatisfactory

   Unsatisfactory

   Neutral

   Satisfactory

   Very Satisfactory

7. Please identify the best feature of your son's school.

   Relationship With Staff

   Friendly Staff

Professional Staff

Teaching Quality

Extra Activities

Price

Management

Innovation

Good Facilities

Food

Other

8. Please identify the worst feature of your son's school.

Relationship With Staff

Unfriendly Staff

Unprofessional Staff

Teaching Quality

Extra Activities

Price

Management

No Innovation

Bad Facilities

Food

Other

9. Which technologies your son or you have contact with in the school context?

Neither my son nor I have contact with any kind of technology

School's website

Specific online platform for parents

Specific online platform for children

Computer classes

Electronic board

Online games encouraged by the school

Other:

10. If your son's school provided a GPS Bracelet that would allow you to see wherever he is and that have the functionality of sending you an alert in the case he got out the expected area, which could be especially useful during school trips or during the summer camps and activities. Would you be interested in this service?

    Yes

    No

11. In the case of one of two similar schools provides this service, would you choose this school because of that?

    Yes

    No

12. Are you willing to pay more to have this service?

    Yes

    No

13. How much per each utilization? ( If you answered "No" above please answer 0)

    0

    >1€

    1-3€

    4-6€

    7-10€

    11-16€

    17-20€

    21-30€

    31-40€

    41-50€

    >50€

14. Imagine now an online platform that facilitates the communication between the teacher and parents, where the first one can post comments, photos and videos about your son's activities, behaviors, achievements, diseases, alimentation, etc, but this information would be only available to the respective parent in order to have the maximum privacy possible. You can have access to this information both through an online platform or a daily report on your email. Are you interested in this service?

    Yes

    No

15. In the case of one of two similar schools provides this service, would you choose this school because of that?

    Yes

    No

16. Are you willing to pay more to have this service?

    Yes

    No

17. How much per month? ( If you answered "No" above please answer 0)

    0

    >1€

    1-3€

    4-6€

    7-10€

    11-16€

    17-20€

    21-30€

    31-40€

    41-50€

    >50€

18. Now picture a software that would allow your son to do his homework in a funnier and more engaging way. The content of this homework would be similar to the traditional one but would be design in order to develop other complementary skills. After finishing the homework it would be sent to the teacher so the feedback give later on can be improved. Would you be interested in this service?

    Yes

    No

19. In the case of one of two similar schools provides this service, would you choose this school because of that?

    Yes

    No

20. Are you willing to pay more to have this service?

    Yes

    No

21. How much per month? ( If you answered "No" above please answer 0)

0

>1€

1-3€

4-6€

7-10€

11-16€

17-20€

21-30€

31-40€

41-50€

>50€

22. Last but not least, if your son's school developed an online game, highly educational but at the same time very entertaining with the possibility of playing with a joystick to encourage his physical activity and playing online with his classmates, would you like to have this service?

Yes

No

23. In the case of one of two similar schools provides this service, would you choose this school because of that?

Yes

No

24. Are you willing to pay more to have this service?

Yes

No

25. How much per month? ( If you answered "No" above please answer 0)

0

>1€

1-3€

4-6€

7-10€

11-16€

17-20€

21-30€

31-40€

41-50€

>50€

26. Rank the four technologies by preference.

__GPS Bracelet

__ Communication Platform

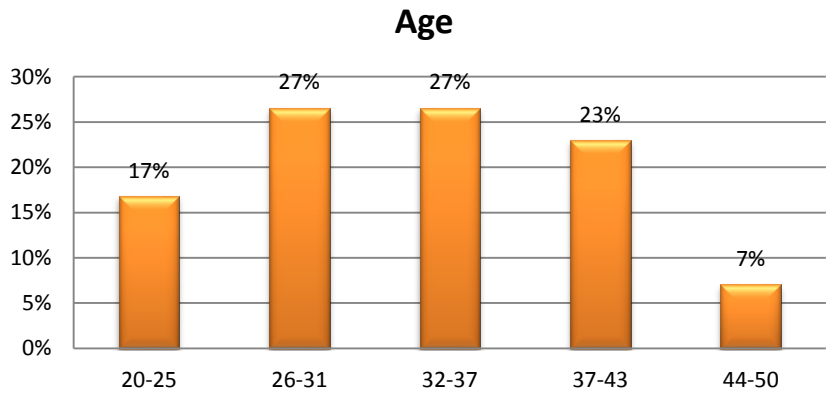
__Homework software

__Didactic online game

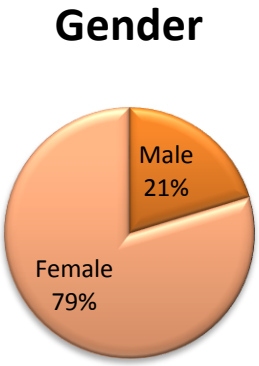
27. Comments:

## Exhibit 8 - Survey Result

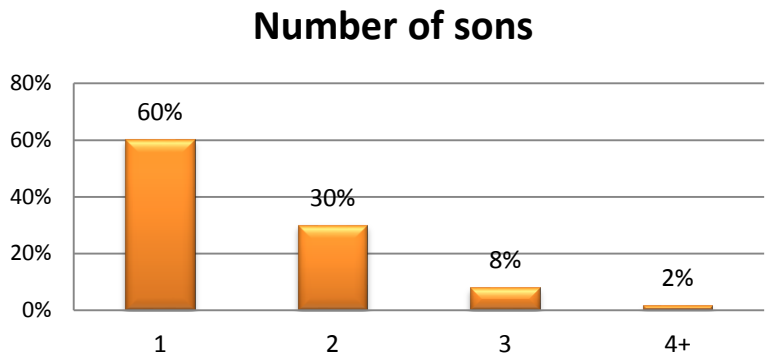
1. Age



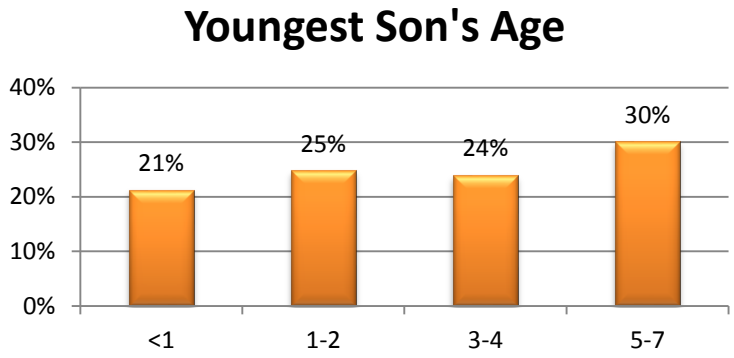

2. Gender



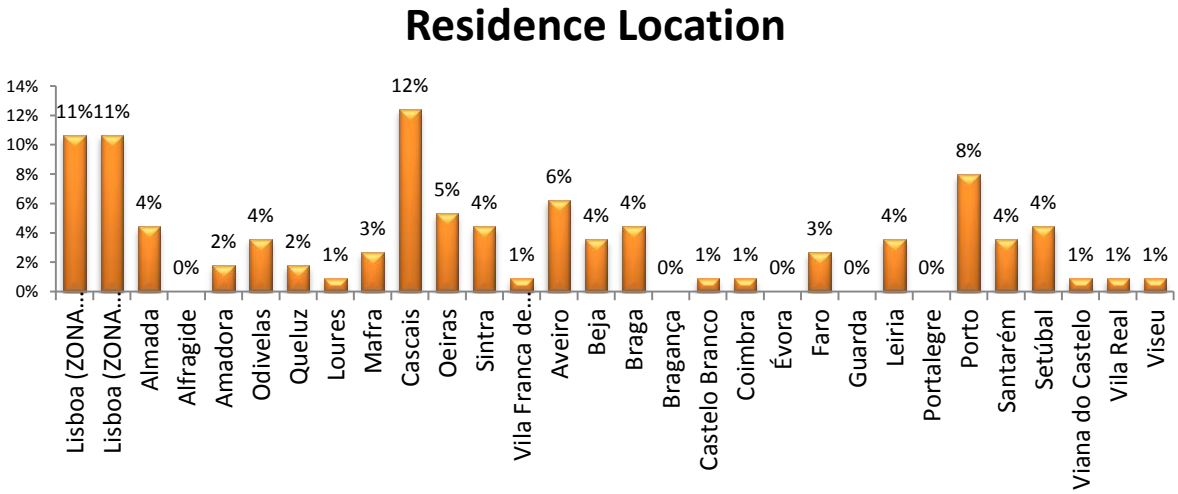
3. Number of sons:



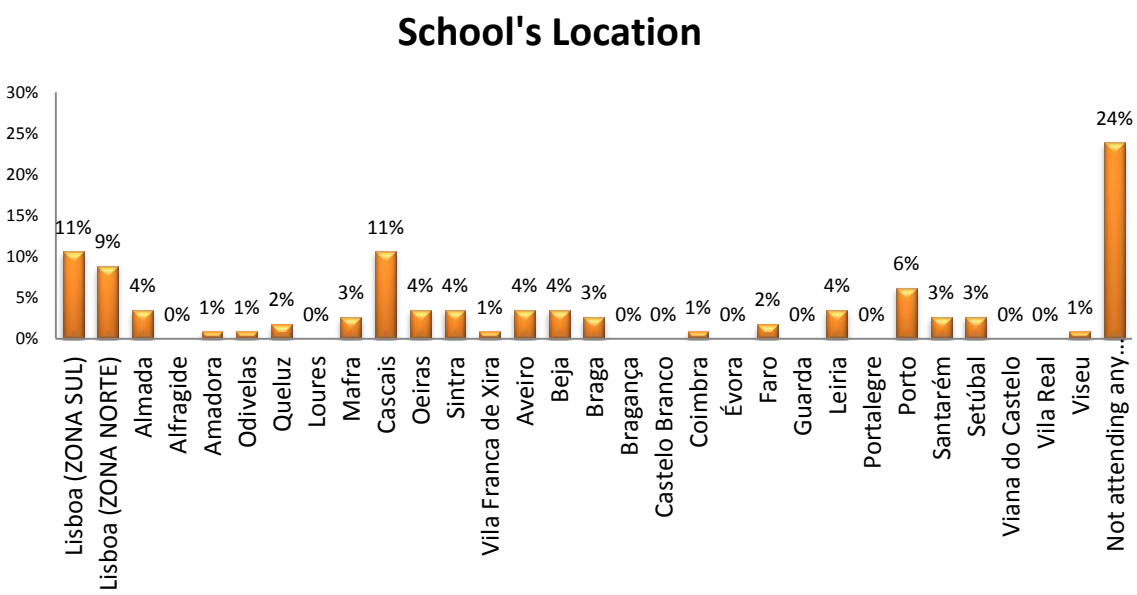

4. Your youngest son's age:



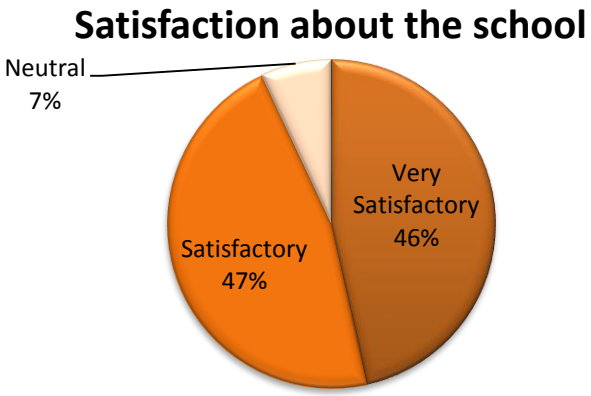

5. Your residence location:



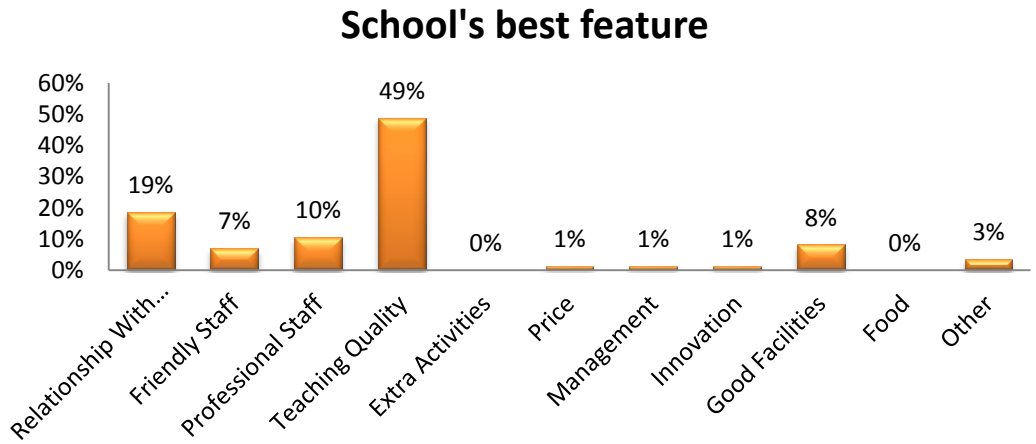
6. Location of your son's school:



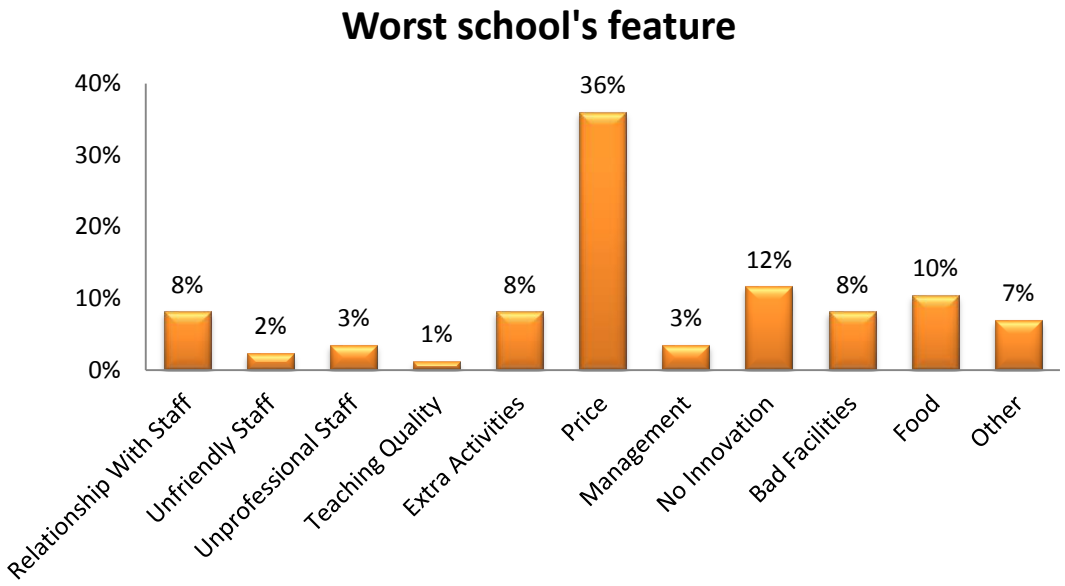

7. How do you evaluate his school?



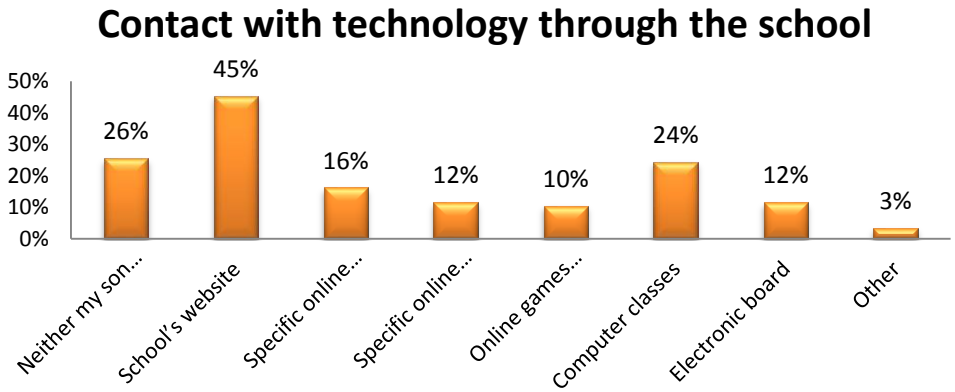

8. Please identify the best feature of your son's school



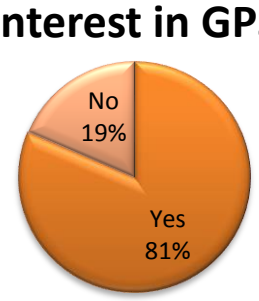
9. Please identify the worst feature of your son's school.



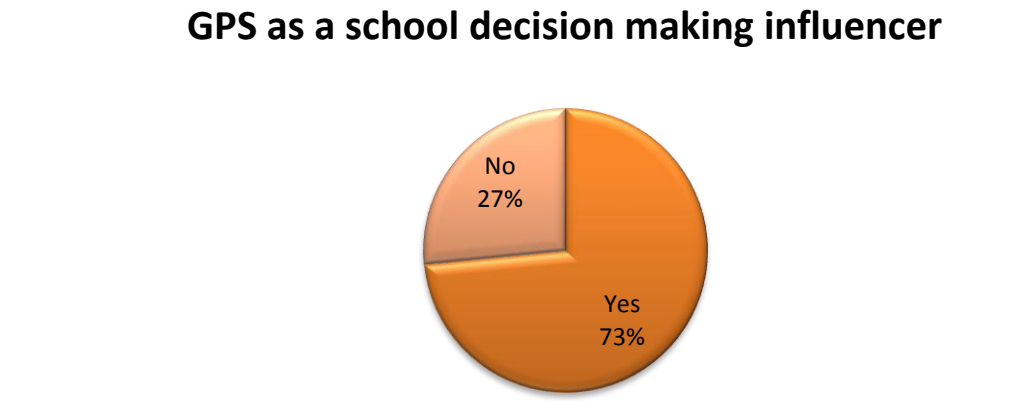

10. Which technologies your son or you have contact with in the school context?



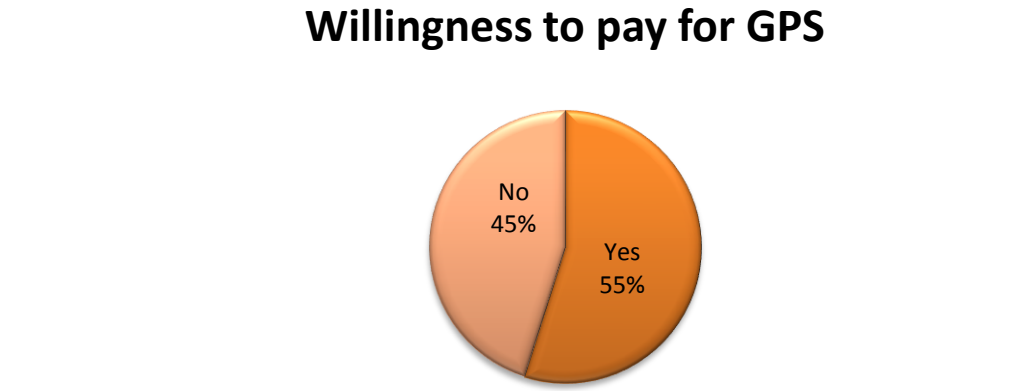

11. If your son's school provided a GPS Bracelet that would allow you to see wherever he is and that have the functionality of sending you an alert in the case he got out the expected area, which could be especially useful during school trips or during the summer camps and activities. Would you be interested in this service?



12. In the case of one of two similar schools provides this service, would you choose this school because of that?



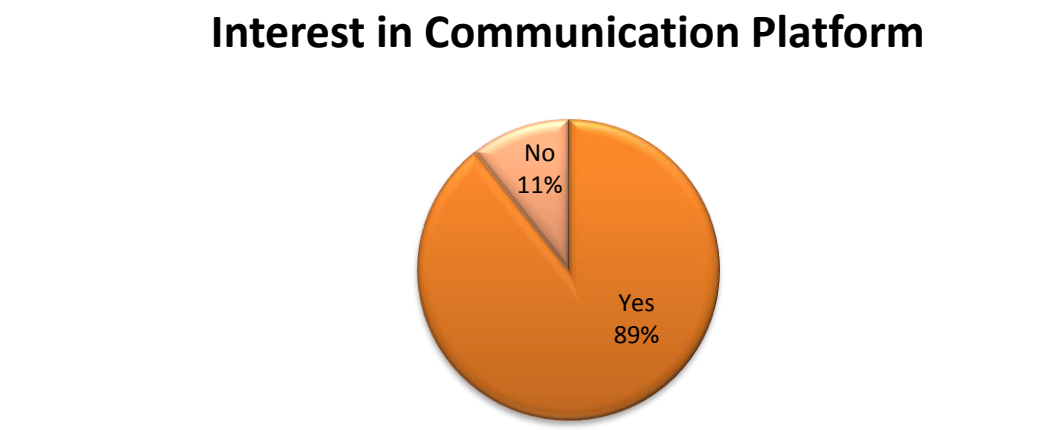

13. Are you willing to pay for this service?



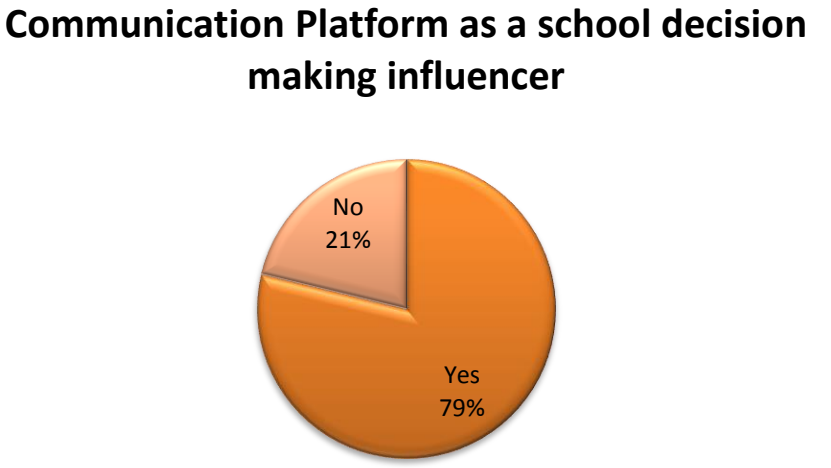

14. How much per each utilization? ( If you answered "No" above please answer 0)

| How much? | # | % |
|---|---|---|
| 0 | 49 | 43% |
| <1€ | 4 | 4% |
| 1-3€ | 12 | 11% |
| 4-6€ | 12 | 11% |
| 7-10€ | 22 | 19% |
| 11-16€ | 3 | 3% |
| 17-20€ | 4 | 4% |
| 21-30€ | 3 | 3% |
| 31-40€ | 0 | 0% |
| 41-50€ | 4 | 4% |
| >50€ | 0 | 0% |
| Total | 113 | 100% |
| Mean | 3,14 | |

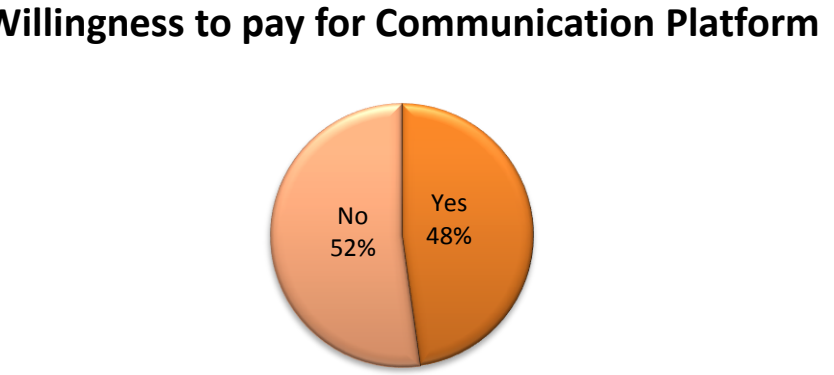
15. Imagine now an online platform that facilitates the communication between the teacher and parents, where the first one can post comments, photos and videos about your son's activities, behaviors, achievements, diseases, alimentation, etc, but this information would be only available to the respective parent in order to have the maximum privacy possible. You can have access to this information both through an online platform or a daily report on your email. Are you interested in this service?




16. Are you willing to pay for this service?



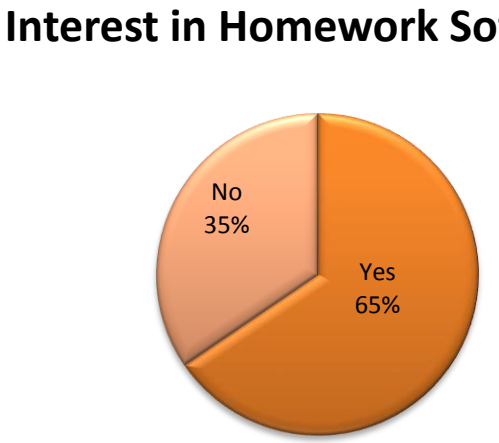

17. Are you willing to pay for this service?



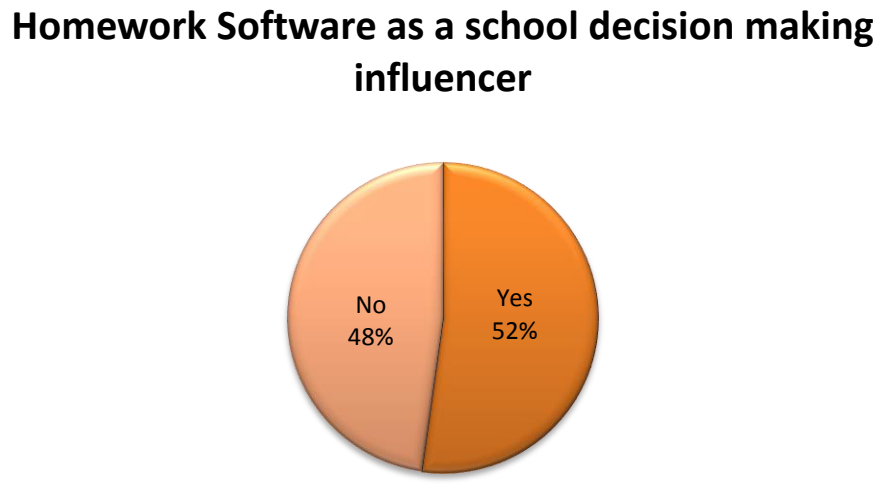
18. How much per month? ( If you answered "No" above please answer 0)

| How much? | # | % |
|---|---|---|
| 0 | 58 | 51% |
| <1€ | 2 | 2% |
| 1-3€ | 10 | 9% |
| 4-6€ | 14 | 12% |
| 7-10€ | 18 | 16% |
| 11-16€ | 3 | 3% |
| 17-20€ | 2 | 2% |
| 21-30€ | 4 | 4% |
| 31-40€ | 0 | 0% |
| 41-50€ | 1 | 1% |
| >50€ | 1 | 1% |
| Total | 113 | |
| **Mean** | 2,53 | |

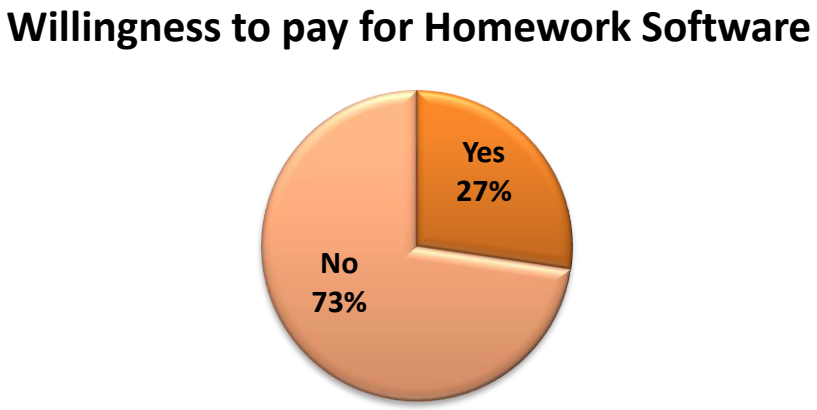
19. Now picture a software that would allow your son to do his homework in a funnier and more engaging way. The content of this homework would be similar to the traditional one but would be design in order to develop other complementary skills. After finishing the homework it would be sent to the teacher so the feedback give later on can be improved. Would you be interested in this service?



20. In the case of one of two similar schools provides this service, would you choose this school because of that?




21. Are you willing to pay for this service?

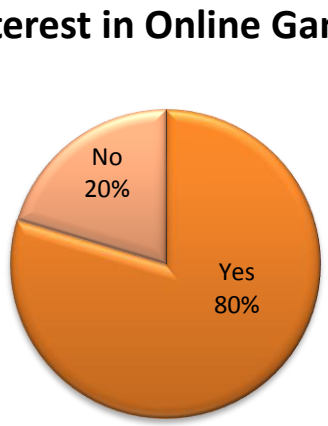



22. How much per month? ( If you answered "No" above please answer 0)

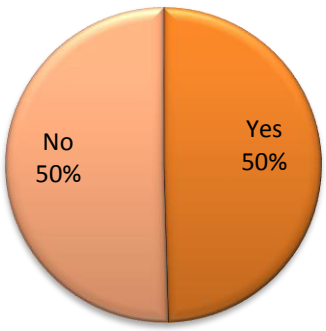
| How much? | # | % |
|---|---|---|
| 0 | 81 | 72% |
| <1€ | 2 | 2% |
| 1-3€ | 6 | 5% |
| 4-6€ | 9 | 8% |
| 7-10€ | 6 | 5% |
| 11-16€ | 2 | 2% |
| 17-20€ | 3 | 3% |
| 21-30€ | 3 | 3% |

| | | |
|---|---|---|
| 31-40€ | 0 | 0% |
| 41-50€ | 0 | 0% |
| >50€ | 1 | 1% |
| Total | 113 | 100% |
| Mean | 1,55 | |

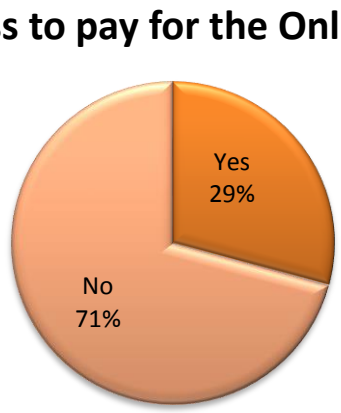
23. Last but not least, if your son's school developed an online game, highly educational but at the same time very entertaining with the possibility of playing with a joystick to encourage his physical activity and playing online with his classmates, would you like to have this service?




24. In the case of one of two similar schools provides this service, would you choose this school because of that?



25. How much per month? ( If you answered "No" above please answer 0)

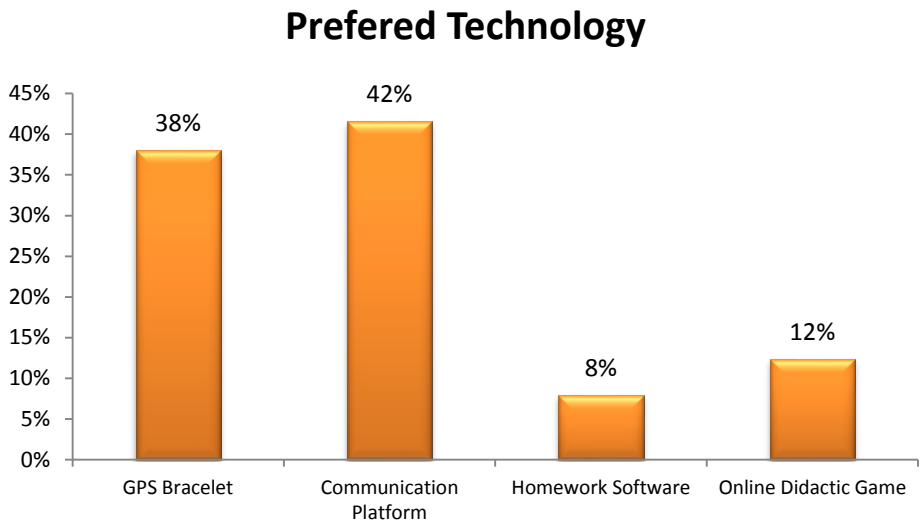



26. How much per month? ( If you answered "No" above please answer 0)

| How much? | # | % |
|---|---|---|
| 0 | 80 | 70% |
| <1€ | 6 | 3% |
| 1-3€ | 5 | 5% |
| 4-6€ | 11 | 11% |
| 7-10€ | 4 | 3% |
| 11-16€ | 1 | 1% |
| 17-20€ | 5 | 5% |
| 21-30€ | 1 | 1% |
| 31-40€ | 0 | 0% |
| 41-50€ | 0 | 0% |
| >50€ | 0 | 0% |
| Total | 113 | 100% |
| | | |
| Mean | 1,14 | |

27. Please rank the four technologies according to your preference:

| | 1 | | 2 | | 3 | | 4 | |
|---|---|---|---|---|---|---|---|---|
| **GPS Bracelet** | 43 | 38% | 29 | 25,66% | 12 | 10,62% | 29 | 25,66% |
| **Communication Platform** | 47 | 42% | 35 | 30,97% | 22 | 19,47% | 9 | 7,96% |
| **Homework Software** | 9 | 8% | 34 | 30,09% | 43 | 38,05% | 27 | 23,89% |
| **Online Didactic Game** | 14 | 12% | 15 | 13,27% | 36 | 31,86% | 48 | 42,48% |


Prefered Technology
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
38%
42%
8%
12%
GPS Bracelet
Communication Platform
Homework Software
Online Didactic Game

## **Exhibit 9 -** Statistical Analysis

### 1. Correlation between Age, Gender, Residence, School location, number of sons and son's age and technology preference

**Correlations**

| | | Prefered Technology | Age | Number_of _sons | Son_Age | Gender | Residence | School location |
|---|---|---|---|---|---|---|---|---|
| Prefered_ Technology | Pearson Correlation | 1 | ,334** | ,200* | ,096 | -,294** | -,145 | -,167 |
| | Sig. (2-tailed) | | ,000 | ,033 | ,314 | ,002 | ,126 | ,077 |
| | N | 113 | 113 | 113 | 113 | 113 | 113 | 113 |
| Age | Pearson Correlation | ,334** | 1 | ,348** | ,422** | -,489** | -,329** | -,444** |
| | Sig. (2-tailed) | ,000 | | ,000 | ,000 | ,000 | ,000 | ,000 |
| | N | 113 | 113 | 113 | 113 | 113 | 113 | 113 |
| Number_of_ sons | Pearson Correlation | ,200* | ,348** | 1 | -,060 | -,159 | -,103 | -,116 |
| | Sig. (2-tailed) | ,033 | ,000 | | ,529 | ,092 | ,276 | ,220 |
| | N | 113 | 113 | 113 | 113 | 113 | 113 | 113 |
| Son_Age | Pearson Correlation | ,096 | ,422** | -,060 | 1 | -,167 | -,060 | -,296** |
| | Sig. (2-tailed) | ,314 | ,000 | ,529 | | ,076 | ,527 | ,001 |
| | N | 113 | 113 | 113 | 113 | 113 | 113 | 113 |
| Gender | Pearson Correlation | -,294** | -,489** | -,159 | -,167 | 1 | ,262** | ,247** |
| | Sig. (2-tailed) | ,002 | ,000 | ,092 | ,076 | | ,005 | ,008 |
| | N | 113 | 113 | 113 | 113 | 113 | 113 | 113 |
| Residence | Pearson Correlation | -,145 | -,329** | -,103 | -,060 | ,262** | 1 | ,614** |
| | Sig. (2-tailed) | ,126 | ,000 | ,276 | ,527 | ,005 | | ,000 |
| | N | 113 | 113 | 113 | 113 | 113 | 113 | 113 |
| School_loca tion | Pearson Correlation | -,167 | -,444** | -,116 | -,296** | ,247** | ,614** | 1 |
| | Sig. (2-tailed) | ,077 | ,000 | ,220 | ,001 | ,008 | ,000 | |
| | N | 113 | 113 | 113 | 113 | 113 | 113 | 113 |

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

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

## 2. Technologies preference according to Age (H1)

| GPS | # respondants | % |
|---|---|---|
| 20-25 | 11 | 26% |
| 26-31 | 14 | 33% |
| 32-37 | 13 | 30% |
| 37-43 | 5 | 12% |
| 44-50 | | 0% |
| **Total** | 43 | **100%** |

Table 1: Respondents that prefer GPS by age.

| CommPlatform | # respondants | % |
|---|---|---|
| 20-25 | 5 | 11% |
| 26-31 | 12 | 26% |
| 32-37 | 14 | 30% |
| 37-43 | 14 | 30% |
| 44-50 | 2 | 4% |
| **Total** | 47 | **100%** |

Table 2: Respondents that prefers Communication Platform by Age

| Homework | # | % |
|---|---|---|
| 20-25 | 1 | 11% |
| 26-31 | 2 | 22% |
| 32-37 | 2 | 22% |
| 37-43 | 3 | 33% |
| 44-55 | 1 | 11% |
| **Total** | **9** | **100%** |

Table 3: Respondents that prefer Homework Software by age.

| Game | # respondants | % |
|---|---|---|
| 20-25 | 2 | 14% |
| 26-31 | 2 | 14% |
| 32-37 | 1 | 7% |
| 37-43 | 4 | 29% |
| 44-50 | 5 | 36% |
| **Total** | 14 | **100%** |

Table 4: Respondents that prefers Online Game by age.

## 3. Technologies preference according to Gender (H2)

| GPS | # | % |
|---|---|---|
| Female | 39 | 91% |
| Male | 4 | 9% |
| **Total** | 43 | 100% |

Table 5: Respondents that prefer GPS by gender.

| CommPlatform | # | % |
|---|---|---|
| Female | 37 | 79% |
| Male | 10 | 21% |
| **Total** | **47** | 100% |

Table 6: Respondents that prefer Communication Platform by gender.

| Homework | # | % |
|---|---|---|
| Female | 6 | 67% |
| Male | 3 | 33% |
| **Total** | **9** | 100% |

Table 7: Respondents that prefer Homework Software by gender.

| Game | # | % |
|---|---|---|
| Female | 8 | 57% |
| Male | 6 | 43% |
| **Total** | **14** | 100% |

Table 8: Respondents that prefer Online Game by gender.

## 4. Technologies preference according to number of sons (H3)

| GPS* Number of sons | # | % |
|---|---|---|
| 1 | 31 | 72% |
| 2 | 8 | 19% |
| 3 | 4 | 9% |
| 4+ | | 0% |
| **Total Geral** | 43 | 100% |

Table 9: Respondents that prefer GPS by number of sons.

| Homework* Number of sons | # | % |
|---|---|---|
| 1 | 4 | 44% |
| 2 | 3 | 33% |
| 3 | 1 | 11% |
| 4+ | 1 | 11% |
| **Total** | **9** | 100% |

Table 11: Respondents that prefer Homework Software by number of sons.

| ComPlat* Number of sons | # | % |
|---|---|---|
| 1 | 27 | 57% |
| 2 | 17 | 36% |
| 3 | 3 | 6% |
| 4+ | | 0% |
| **Total Geral** | 47 | 100% |

Table 10: Respondents that prefer Communication Platform by number of sons.

| Game* Number of sons | # | % |
|---|---|---|
| 1 | 6 | 43% |
| 2 | 6 | 43% |
| 3 | 1 | 7% |
| 4+ | 1 | 7% |
| **Total Geral** | 14 | 100% |

Table 12: Respondents that prefer Online Game by number of sons.

## 5. Technologies preference according to sons' age (H4)

| GPS* Sons' Age | # | % |
|---|---|---|
| <1 | 8 | 19% |
| 1-2 | 13 | 30% |
| 3-4 | 11 | 26% |
| 5-7 | 11 | 26% |
| **Total Geral** | 43 | 100% |

Table 13: Respondents that prefer GPS According to their sons' age.

| Homework* Sons' Age | # | % |
|---|---|---|
| <1 | 4 | 44% |
| 1-2 | 2 | 22% |
| 3-4 | | 0% |
| 5-7 | 3 | 33% |
| **Total** | **9** | 100% |

Table 15: Respondents that prefer Homework Software according to their son' age

| ComPlat* Sons' Age | # | % |
|---|---|---|
| <1 | 9 | 19% |
| 1-2 | 13 | 28% |
| 3-4 | 13 | 28% |
| 5-7 | 12 | 26% |
| **Total Geral** | 47 | 100% |

Table 14: Respondents that prefer Communication Platform according to their sons' age.

| Game* Sons' Age | # | % |
|---|---|---|
| <1 | 3 | 21% |
| 1-2 | | 0% |
| 3-4 | 3 | 21% |
| 5-7 | 8 | 57% |
| **Total Geral** | 14 | 100% |

Table 16: Respondents that prefer Online Game according to their sons' age.

## 6. Technologies preference according to the residence location (H5)

| Residence*GPS | # | % |
|---|---|---|
| Almada | 3 | 7% |
| Amadora | | 0% |
| Aveiro | 2 | 5% |
| Beja | 2 | 5% |
| Braga | 4 | 9% |
| Cascais | 2 | 5% |
| Castelo Branco | 1 | 2% |
| Coimbra | | 0% |
| Faro | 2 | 5% |
| Leiria | | 0% |
| Lisboa (ZONA NORTE) | 3 | 7% |
| Lisboa (ZONA SUL) | 3 | 7% |
| Loures | | 0% |
| Mafra | 3 | 7% |
| Odivelas | 3 | 7% |
| Oeiras | 2 | 5% |
| Porto | 4 | 9% |
| Queluz | | 0% |
| Santarém | 3 | 7% |
| Setúbal | 3 | 7% |
| Sintra | 1 | 2% |
| Viana do Castelo | 1 | 2% |
| Vila Franca de Xira | | 0% |
| Vila Real | | 0% |
| Viseu | 1 | 2% |
| Total | **43** | **100%** |

Table 17: Respondents that prefer GPS by district.

| Residence*CommunicationPlatform | # | % |
|---|---|---|
| Almada | 1 | 2% |
| Amadora | 2 | 4% |
| Aveiro | 4 | 9% |
| Beja | 2 | 4% |
| Braga | | 0% |
| Cascais | 6 | 13% |
| Castelo Branco | | 0% |
| Coimbra | | 0% |
| Faro | | 0% |
| Leiria | 3 | 6% |
| Lisboa (ZONA NORTE) | 5 | 11% |
| Lisboa (ZONA SUL) | 5 | 11% |
| Loures | | 0% |
| Mafra | | 0% |
| Odivelas | 1 | 2% |
| Oeiras | 4 | 9% |
| Porto | 4 | 9% |
| Queluz | 2 | 4% |
| Santarém | 1 | 2% |
| Setúbal | 1 | 2% |
| Sintra | 4 | 9% |
| Viana do Castelo | | 0% |
| Vila Franca de Xira | 1 | 2% |
| Vila Real | 1 | 2% |
| Viseu | | 0% |
| **Total** | **47** | **100%** |

Table 18: Respondents that prefer Communication Platform by district.

| Residence*Homework | # | % |
|---|---|---|
| Almada | | 0% |
| Amadora | | 0% |
| Aveiro | | 0% |
| Beja | | 0% |
| Braga | 1 | 11% |
| Cascais | 3 | 33% |
| Castelo Branco | | 0% |
| Coimbra | | 0% |
| Faro | | 0% |
| Leiria | | 0% |
| Lisboa (ZONA NORTE) | 2 | 22% |
| Lisboa (ZONA SUL) | 1 | 11% |
| Loures | 1 | 11% |
| Mafra | | 0% |
| Odivelas | | 0% |
| Oeiras | | 0% |
| Porto | | 0% |
| Queluz | | 0% |
| Santarém | | 0% |
| Setúbal | 1 | 11% |
| Sintra | | 0% |
| Viana do Castelo | | 0% |
| Vila Franca de Xira | | 0% |
| Vila Real | | 0% |
| Viseu | | 0% |
| **Total** | **9** | **100%** |

Table 19: Respondents that prefers Homework Software by district.

| Residence*Game | # | % |
|---|---|---|
| Almada | 1 | 7% |
| Amadora | | 0% |
| Aveiro | 1 | 7% |
| Beja | | 0% |
| Braga | | 0% |
| Cascais | 3 | 21% |
| Castelo Branco | | 0% |
| Coimbra | 1 | 7% |
| Faro | 1 | 7% |
| Leiria | 1 | 7% |
| Lisboa (ZONA NORTE) | 2 | 14% |
| Lisboa (ZONA SUL) | 3 | 21% |
| Loures | | 0% |
| Mafra | | 0% |
| Odivelas | | 0% |
| Oeiras | | 0% |
| Porto | 1 | 7% |
| Queluz | | 0% |
| Santarém | | 0% |
| Setúbal | | 0% |
| Sintra | | 0% |
| Viana do Castelo | | 0% |
| Vila Franca de Xira | | 0% |
| Vila Real | | 0% |
| Viseu | | 0% |
| **Total** | **14** | 100% |

Table20: Respondents that prefers Online Game by district.

## 7. Technologies preference according to the School Location (H6)

| School location*GPS | # | % |
|---|---|---|
| Almada | 2 | 5% |
| Amadora | | 0% |
| Aveiro | | 0% |
| Beja | 2 | 5% |
| Braga | 2 | 5% |
| Cascais | 1 | 2% |
| Coimbra | | 0% |
| Faro | 1 | 2% |
| Leiria | 1 | 2% |
| Lisboa (ZONA NORTE) | 1 | 2% |
| Lisboa (ZONA SUL) | 3 | 7% |
| Mafra | 3 | 7% |
| Not attending any school | 14 | 33% |
| Odivelas | 1 | 2% |
| Oeiras | 2 | 5% |
| Porto | 3 | 7% |
| Queluz | | 0% |
| Santarém | 2 | 5% |
| Setúbal | 3 | 7% |
| Sintra | 1 | 2% |
| Vila Franca de Xira | | 0% |
| Viseu | 1 | 2% |
| Total Geral | 43 | 100% |

Table 21: Respondents that prefer GPS by district.

| School_location*CP | # | % |
|---|---|---|
| Almada | 1 | 2% |
| Amadora | 1 | 2% |
| Aveiro | 4 | 9% |
| Beja | 2 | 4% |
| Braga | | 0% |
| Cascais | 5 | 11% |
| Coimbra | | 0% |
| Faro | | 0% |
| Leiria | 2 | 4% |
| Lisboa (ZONA NORTE) | 6 | 13% |
| Lisboa (ZONA SUL) | 6 | 13% |
| Mafra | | 0% |
| Not attending any school | 8 | 17% |
| Odivelas | | 0% |
| Oeiras | 2 | 4% |
| Porto | 3 | 6% |
| Queluz | 2 | 4% |
| Santarém | 1 | 2% |
| Setúbal | | 0% |
| Sintra | 3 | 6% |
| Vila Franca de Xira | 1 | 2% |
| Viseu | | 0% |
| Total Geral | 47 | 100% |

Table 22: Respondents that prefer Communication Platform by district.

| School_location*Homework | # | % |
|---|---|---|
| Almada | | 0% |
| Amadora | | 0% |
| Aveiro | | 0% |
| Beja | | 0% |
| Braga | 1 | 11% |
| Cascais | 3 | 33% |
| Coimbra | | 0% |
| Faro | | 0% |
| Leiria | | 0% |
| Lisboa (ZONA NORTE) | 2 | 22% |
| Lisboa (ZONA SUL) | | 0% |
| Mafra | | 0% |
| Not attending any school | 3 | 33% |
| Odivelas | | 0% |
| Oeiras | | 0% |
| Porto | | 0% |
| Queluz | | 0% |
| Santarém | | 0% |
| Setúbal | | 0% |
| Sintra | | 0% |
| Vila Franca de Xira | | 0% |
| **Total Geral** | **9** | 100% |

Table 23: Respondents that prefer Homework Software by district.

| School_location*Game | # | % |
|---|---|---|
| Almada | 1 | 7% |
| Amadora | | 0% |
| Aveiro | | 0% |
| Beja | | 0% |
| Braga | | 0% |
| Cascais | 3 | 21% |
| Coimbra | 1 | 7% |
| Faro | 1 | 7% |
| Leiria | 1 | 7% |
| Lisboa (ZONA NORTE) | 1 | 7% |
| Lisboa (ZONA SUL) | 3 | 21% |
| Mafra | | 0% |
| Not attending any school | 2 | 14% |
| Odivelas | | 0% |
| Oeiras | | 0% |
| Porto | 1 | 7% |
| Queluz | | 0% |
| Santarém | | 0% |
| Setúbal | | 0% |
| Sintra | | 0% |
| Vila Franca de Xira | | 0% |
| **Total Geral** | **14** | **100%** |

Table 24: Respondents that prefer Online Game by district.

# Exhibit 10 - Segmentation

## 1. Characteristics of the sample that does not have their sons in any school

| Characteristics | Most Common Answer | Percentage Occured |
|---|---|---|
| **Age** | 20-25 | 44% |
| **Gender** | **Female** | **89%** |
| **Number_of_sons** | **1** | **70%** |
| **Son_Age** | <1 | 44% |
| **Residence** | Lisboa (ZONA NORTE) | 15% |
| **School_location** | Not attending any school | 100% |
| **GPS_Interest** | **Yes** | **96%** |
| **GPS_choice_influence** | **Yes** | **93%** |
| **GPS_Willingness_to_pay** | **Yes** | **63%** |
| **GPS_How_much** | **11,09 €** | |
| **CommunicationPlatform_Interest** | **Yes** | **85%** |
| **CommunicationPlatform_choice_influence** | **Yes** | **85%** |
| **CommunicationPlatform_willingness_to_pay** | No | 52% |
| **CommunicationPlatform_how_much** | 5,26 € | |
| **Homework_Interest** | Yes | 56% |
| **Homework_choice_influence** | No | 56% |
| **Homework_willingness_to_pay** | No | 74% |
| **Homework_how_much** | 4,89 € | |
| **Game_Interest** | Yes | 74% |
| **Game_choice_influence** | Yes | 48% |
| **Game_willingness_to_pay** | No | 74% |
| **Game_how_much** | 2,41 € | |
| **Prefered_Technology** | **GPS** | **52%** |

## 2. Characteristics of the sample that prefers GPS

| Characteristics | Most Common Answer | Percentage Occured |
|---|---|---|
| **Age** | 26-31 | 33% |
| **Gender** | Female | 91% |
| **Number_of_sons** | 1 | 72% |
| **Son_Age** | 1-2 | 30% |
| **Residence** | Porto | 9% |
| **School_location** | Not attending any school | 33% |
| **School_evaluation** | Satisfied | 44% |
| **School_advantage** | Teaching Quality | 21% |
| **School_disadvantages** | Price | 23% |
| **SchoolTechnologies_website** | Website | 30% |
| **GPS_Interest** | Yes | 98% |
| **GPS_choice_influence** | Yes | 98% |
| **GPS_Willingness_to_pay** | Yes | 81% |
| **GPS_How_much** | 9,42 € | 35% |
| **CommunicationPlatform_Interest** | Yes | 88% |
| **CommunicationPlatform_choice_influence** | Yes | 88% |
| **CommunicationPlatform_willingness_to_pay** | No | 53% |
| **CommunicationPlatform_how_much** | 2,50 € | 56% |
| **Homework_Interest** | Yes | 63% |
| **Homework_choice_influence** | Yes | 56% |
| **Homework_willingness_to_pay** | No | 81% |
| **Homework_how_much** | 1,31 € | 81% |
| **Game_Interest** | Yes | 74% |
| **Game_choice_influence** | Yes | 56% |
| **Game_willingness_to_pay** | No | 77% |
| **Game_how_much** | 0,72 € | 79% |
| **GPS_Rank** | 1 | 100% |
| **CommunicationPlatform_Rank** | 2 | 58% |
| **Homework_Rank** | 4 | 35% |
| **Game_Rank** | 4 | 53% |

## 3. Characteristics of the sample that prefers Communication Platform

| Characteristics | Most Common Answer | Percentage Occured |
|---|---|---|
| **Age** | 32-37 | 30% |
| **Gender** | Female | 79% |
| **Number_of_sons** | 1 | 57% |
| **Son_Age** | 1-2 | 28% |
| **Residence** | Lisboa (Zona Norte) | 13% |
| **School_location** | Not attending any school | 17% |
| **School_evaluation** | Very Satisfied | 49% |
| **School_advantage** | Teaching Quality | 43% |
| **School_disadvantages** | Price | 23% |
| **SchoolTechnologies_None** | None | 28% |
| **SchoolTechnologies_website** | Website | 40% |
| **GPS_Interest** | **Yes** | **77%** |
| **GPS_choice_influence** | Yes | 64% |
| **GPS_Willingness_to_pay** | Yes | 53% |
| **GPS_How_much** | **6,16 €** | |
| **CommunicationPlatform_Interest** | **Yes** | **98%** |
| **CommunicationPlatform_choice_influence** | **Yes** | **87%** |
| **CommunicationPlatform_willingness_to_pay** | **Yes** | **68%** |
| **CommunicationPlatform_how_much** | **8,65 €** | |
| **Homework_Interest** | Yes | 64% |
| **Homework_choice_influence** | No | 53% |
| **Homework_willingness_to_pay** | No | 64% |
| **Homework_how_much** | 3,49 € | |
| **Game_Interest** | Yes | 81% |
| **Game_choice_influence** | No | 64% |
| **Game_willingness_to_pay** | No | 74% |
| **Game_how_much** | 2,20 € | |
| **GPS_Rank** | 2 | 49% |
| **CommunicationPlatform_Rank** | 1 | 100% |
| **Homework_Rank** | 3 | 47% |
| **Game_Rank** | 4 | 45% |

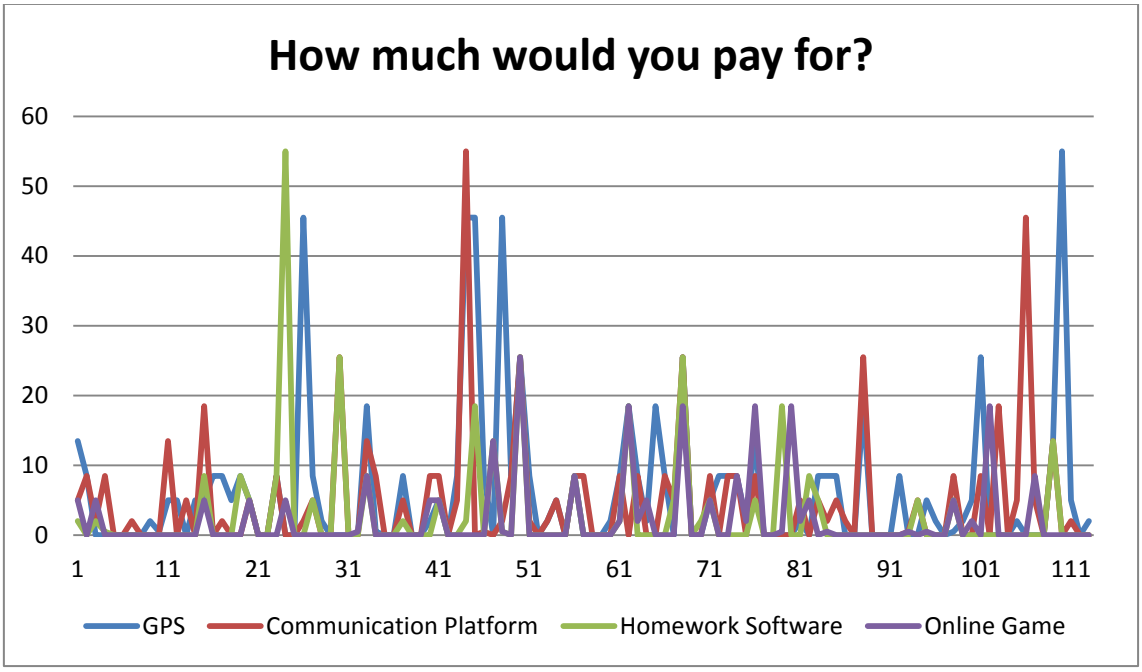
## 4. Characteristics of the sample that prefers Homework Software

| Characteristics | Most Common Answer | Percentage Occured |
|---|---|---|
| **Age** | 37-43 | 33% |
| **Gender** | Female | 67% |
| **Number_of_sons** | 1 | 44% |
| **Son_Age** | <1 | 44% |
| **Residence** | Cascais | 33% |
| **School_location** | Cascais | 33% |
| **School_evaluation** | Satisfied | 33% |
| **School_advantage** | Teaching Quality | 44% |
| **School_disadvantages** | Price | 22% |
| **SchoolTechnologies_website** | Website | 33% |
| **GPS_Interest** | Yes | 67% |
| **GPS_choice_influence** | Yes | 56% |
| **GPS_Willingness_to_pay** | **No** | **100%** |
| **GPS_How_much** | **0** | |
| **CommunicationPlatform_Interest** | **Yes** | **89%** |
| **CommunicationPlatform_choice_influence** | **Yes** | **56%** |
| **CommunicationPlatform_willingness_to_pay** | **No** | **100%** |
| **CommunicationPlatform_how_much** | **0** | |
| **Homework_Interest** | **Yes** | **100%** |
| **Homework_choice_influence** | **Yes** | **100%** |
| **Homework_willingness_to_pay** | Yes | 56% |
| **Homework_how_much** | **9,78€** | |
| **Game_Interest** | **Yes** | **89%** |
| **Game_choice_influence** | **Yes** | **89%** |
| **Game_willingness_to_pay** | **Yes** | **56%** |
| **Game_how_much** | 2,72€ | |
| **GPS_Rank** | 4 | 44% |
| **CommunicationPlatform_Rank** | 2 | 56% |
| **Homework_Rank** | 1 | 100% |
| **Game_Rank** | 4 | 44% |

## 5. Characteristics of the sample that prefers Online Didactic Game

| Characteristics | Most Common Answer | Percentage Occured |
|---|---|---|
| **Age** | 44-55 | 36% |
| **Gender** | Female | 57% |
| **Number_of_sons** | 1 | 43% |
| **Son_Age** | 5-7 | 57% |
| **Residence** | Lisboa (Zona Sul) | 21% |
| **School_location** | Lisboa (Zona Sul) | 21% |
| **School_evaluation** | Very Satisfied | 43% |
| **School_advantage** | Teaching Quality | 64% |
| **School_disadvantages** | Price | 57% |
| **SchoolTechnologies_website** | Website | 29% |
| **SchoolTechnologies_computerclasses** | Computer Classes | 36% |
| **GPS_Interest** | Yes | 57% |
| **GPS_choice_influence** | No | 57% |
| **GPS_Willingness_to_pay** | **No** | **86%** |
| **GPS_How_much** | 1,11 € | |
| **CommunicationPlatform_Interest** | Yes | 64% |
| **CommunicationPlatform_choice_influence** | No | 64% |
| **CommunicationPlatform_willingness_to_pay** | **No** | **86%** |
| **CommunicationPlatform_how_much** | **1,00 €** | |
| **Homework_Interest** | Yes | 57% |
| **Homework_choice_influence** | **No** | **71%** |
| **Homework_willingness_to_pay** | **No** | **100%** |
| **Homework_how_much** | **0,36 €** | |
| **Game_Interest** | Yes | 86% |
| **Game_choice_influence** | No | 50% |
| **Game_willingness_to_pay** | No | 57% |
| **Game_how_much** | 4,75 € | |
| **GPS_Rank** | 4 | 57% |
| **CommunicationPlatform_Rank** | 2 | 43% |
| **Homework_Rank** | 1 | 43% |
| **Game_Rank** | 4 | 100% |

## 6. Willingness to pay for each Technology




| (In €) | GPS | Communication Platform | Homework Software | Online Game |
|---|---|---|---|---|
| **AVERAGE** | 6,20 € | 4,64 € | 2,86 € | 2,07 € |