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# designing typozilla

**<http://www.typozilla.co.nz>**

An online application that appeals to gifted children.

A thesis presented in partial fulfilment of the requirements for the degree of Masters in Design at Massey University, Wellington, New Zealand.

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## ABSTRACT

This thesis responds to the specific educational and social needs of gifted children within the context of online applications. Online enrichment activities and social opportunities are only successful if they are able to attract and sustain attention of the advanced interests of gifted children.

The aim of the research is to design an online application that appeals to gifted children and recognises the identified intellectual and social needs within the New Zealand context. This was achieved through research through design by establishing a design strategy that uses the findings of investigations and applies them to a prototype application. Developers of online content for gifted children may benefit from this research.

As an initial investigation a survey was conducted about how gifted New Zealand primary school children are using online applications. It was assumed following the literature review that online applications would appeal to gifted children if they teach a new skill, have multiplayer functionality and address higher order thinking skills. Basic design characteristics of the most popular gaming websites amongst gifted children (from the survey) were then used to inform the design strategy and to develop the prototype online application typozilla.

Key findings were retrieved through observation of gifted children using typozilla. The majority of children observed were especially enthusiastic seeing other players' avatars within multiplayer areas and competing against each other. They enjoyed learning a new skill (which was touch-typing) and engaging in creative tasks. In interviews all gifted children confirmed that they perceived the typozilla design as appealing.

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## **1. INTRODUCTION**

*This chapter outlines the problem, which is tackled in the research and summarises the aim and scope of the study. It also provides an overview of the structure of the thesis.*



## 1.1 Problem description

Children with above average intelligence need more challenging tasks than their peers (Porter, 2005), but while children at the lower end of the intelligence scale get provision in the form of special education, gifted children do not get this special instruction to the same extent. This is due to one of the main misconceptions about gifted children: the belief that they can take care of themselves and learn on their own (Sousa, 2003). This common misconception has led to the needs of gifted children not being met. Moltzen (1999) states that in many countries, like New Zealand, a history of egalitarian attitudes underpins resistance to appropriate provisions for gifted children even if their special needs are familiar to many teachers and parents:

*In New Zealand we have a proud record of initiatives aimed at improving the educational outcomes for those who begin their schooling with some disadvantage. The resources dedicated to this end, especially more recently, have been considerable. Such efforts are justified and commendable. However, the converse side of this seems to be a belief that the gifted start school with an advantage, and for this reason it would be inequitable to add advantage to advantage by providing special programmes for them. To some the solution to achieving equality of outcome is to cut down the tall poppies, so we end up with an educational bed of flowers as uniform in height as possible (Moltzen, 1999, ¶ 9).*

The researcher's interest in the topic gifted education started as she observed that a mathematically gifted boy who taught himself how to play chess by observing other players at the age of four, ended up being put in the lowest math group in his age level at primary school.

By his kindergarten teacher he was referred to an educational psychologist, due to behavioural issues. There it turned out that he was gifted and that he was bored and did not have intellectual peers in his kindergarten group. The parents assumed he would do well at school, where they supposed that he would be challenged. During the first two years at school he was regarded as "bright" by the teachers. At the beginning of year three he had not done well in maths tests and was therefore put in the lowest maths group. The teacher described the boy as unorganised, class-clown and having behavioural problems in the playground. The child described the situation at school as extremely boring ("for babies"), annoying and frustrating. He was completely

withdrawn and it was a long process to bring him up from this position of underachievement.

The same boy loved to play games on a computer. He has been using online applications since the age of two. At the age of eight his gaming skills were quite advanced. He liked games, which were challenging intellectually, but those were often not age-appropriate. The researcher wondered why the boy never played any “educational” games, but was quite attracted from multiplayer applications and the researcher developed the idea to investigate how online applications should be designed in order to be beneficial for gifted children. This initial aim was refined over time.

## **1.2 Research aim**

This thesis addresses the problem of gifted children not getting appropriate provision in their education and explores possibilities that the online medium offers for providing this kind of special instruction. Teaching gifted children is becoming an increasingly important topic in New Zealand. Since 1998 the Ministry of Education has tried to support the learning of gifted children through the use of ICT (Ministry of Education, 2002). The aesthetic and usability aspects play a major role in determining if an ICT product is successful or not (Gemser, Jacobs, & Cate, 2004). If, for example, an online application does not look attractive or is too hard to navigate, children are less likely to use it, even if the content and possibilities, which this application offers, would be beneficial to or liked by the child. Therefore the main aim of the research is to design an online application that appeals to gifted children and recognises their identified intellectual and social needs within the New Zealand context.

## **1.3 Overview of the study**

To achieve this aim, Chapter 2 examines the literature and provides background information about theoretical research in the area of gifted children such as their characteristics and identification, as well as particular issues. It also points out the contemporary practices with regard to providing appropriate support and identifies a gap in the literature about how gifted children use online applications. Leading on from

this, Chapter 3 develops appropriate research methods for undertaking this research. Chapter 4 presents results of investigations into how gifted children are using online applications and identifies precedents from their most popular applications. Chapter 5 uses the common characteristics from gifted children's most popular sites to develop a design strategy. It develops a prototype online application that is useful for carrying out the validation of this research and describes applications with the same topic as the prototype (which is touch-typing). The chapter also explains the iterative design development process of the prototype application and discusses wider consequences from evaluating the prototype application. Finally, conclusions are drawn in Chapter 6.

## 2. BACKGROUND THEORY

*In order to do research on online applications for gifted children it is first necessary to get an understanding of how giftedness is defined and how it can be nurtured. This chapter examines the literature and provides background information about theoretical research in the area of gifted children such as characteristics and identification of gifted children as well as particular educational and social issues of gifted children.*

*Contemporary practices with regard to providing appropriate support and activities for gifted children have been listed if they were considered relevant in the context of online applications.*

*With regard to gifted children's online application use a gap in the literature was identified. Therefore literature on children's media usage from the whole population (not explicitly gifted) has been cited. Those citations will be compared to research findings on gifted children based on investigations in this study in Chapter 4.*

## 2.1 Literature concerning gifted children

### 2.1.1 Defining and identifying giftedness

There is no national definition of giftedness in New Zealand (McDonough & Rutherford, 2009) and up to now there has been no agreement between scholars in the field of gifted education about what “gifted” precisely means. Francis Galton, who used the term first in 1869, referred to adults who demonstrated exceptional talent in some area, for example, a gifted chemist (Bainbridge, no date given). In 1905 Alfred Binet established the first intelligence test, which has been revised several times. Intelligence tests measure general intellectual ability as “intelligence quotient” (IQ): the higher the IQ number, the higher the level of giftedness. Those levels of giftedness are not standardised, but usually ascending in the following order: gifted or moderately gifted, highly gifted, exceptionally gifted, and profoundly gifted.

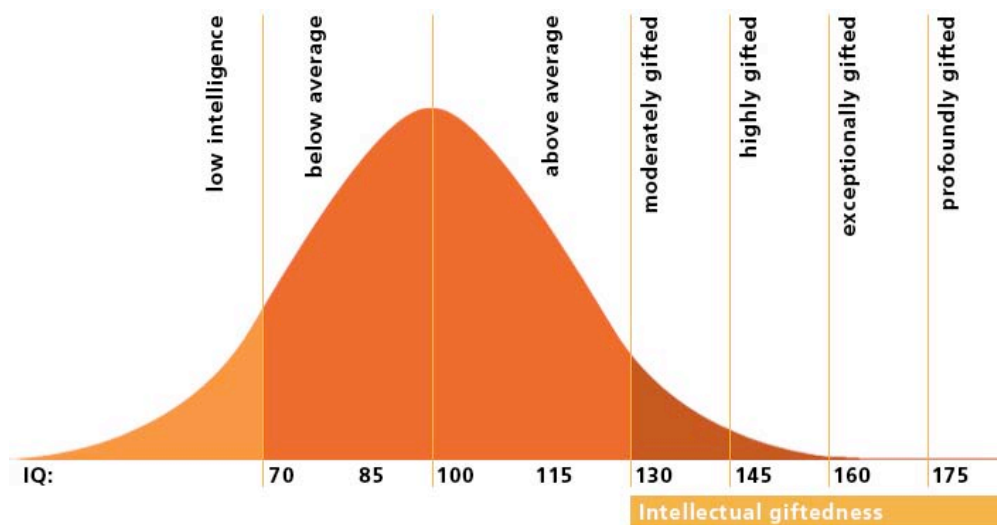


Figure 1. *Levels of giftedness according to Extended Wechsler Intelligence Scales for Children (Carolyn, 2009).*

In this thesis the term giftedness is used according to the levels of giftedness described in the extended Wechsler Intelligence Scales for Children, because this is one of the most widely used IQ tests in New Zealand. However, from an early stage in the history of IQ testing, people have questioned if intelligence could be satisfactorily expressed by

one single number (Cathcart, 2005). Renzulli, one of the leading contemporary researchers in the field of gifted education criticises most historical studies for equating intelligence with giftedness:

*Our present efforts to define giftedness are based on a long history of previous studies dealing with human abilities. Most of these studies focused mainly on the concept of intelligence and are an attempt to equate intelligence with giftedness (Renzulli, 2003, p. 80).*

Questions concern if there are one or more intelligence types. Howard Gardner (1999) proposes that there are several intelligences, which are relatively autonomous. In his multiple intelligences concept he originally posited seven kinds of intelligence, which are: 1. linguistic, 2. logical-mathematical, 3. spatial, 4. musical, 5. bodily-kinaesthetic, 6. interpersonal and 7. intrapersonal intelligence. In his latest version, Gardner added 8. naturalist and 9. existentialist intelligence.

Also Clark (2002) claimed that the definition of intelligence should no longer be limited to cognitive and academic performance, but rather include the identification in affective, intuitive/creative and physical motor/sensory areas of brain function as well. However, even if IQ scores might not be a perfect measure of intellectual giftedness, and although individuals can be gifted in domains other than the intellectual, children are still often identified through their IQ scores (Porter, 2005).

Not all gifted children are identified as such, partly because of insufficient testing procedures, but even more, because there is no requirement for all children to be tested. Those children who were referred for tests were most often not referred due to outstanding academic performance but rather because of difficulties and behavioural issues (Silverman, 2009b).

Therefore in this thesis the term nonidentified children is used in order to describe children from the whole population who were not yet tested or not closer specified. To use the term average children would be wrong, because it is very likely that within the population of nonidentified children there will be gifted children as well. Another reason for not using the term average is that it might have negative connotations for some people.

### 2.1.2 Characteristics of gifted children

Allan (2005) states that gifted children are fascinated by computers and make frequent use of the internet as a research tool so that designing an online application for gifted children is going to be a promising approach.

The following list of 25 characteristics of giftedness helps to match an online application to the profile of its users. The list is based on extensive research from the Gifted Development Center from over 20 years. If a child fits three-quarters of these traits, there is an 84 percent chance that he or she will score beyond 120 IQ on individual testing (Silverman, 1998).


- 
- |  |  |
|--|--|
| 1. Reasons well (good thinker)               | 14. Prefers older companions or adults                               |
| 2. Learns rapidly                            | 15. Has a wide range of interests                                    |
| 3. Has extensive vocabulary                  | 16. Has a great sense of humor                                       |
| 4. Has an excellent memory                   | 17. Early or avid reader (if too young to read, loves being read to) |
| 5. Has a long attention span (if interested) | 18. Concerned with justice, fairness                                 |
| 6. Sensitive (feelings hurt easily)          | 19. Judgment mature for age at times                                 |
| 7. Shows compassion                          | 20. Is a keen observer   |
| 8. Perfectionistic                           | 21. Has a vivid imagination  |
| 9. Intense                                   | 22. Is highly creative   |
| 10. Morally sensitive                        | 23. Tends to question authority                                      |
| 11. Has strong curiosity                     | 24. Has facility with numbers  |
| 12. Perseverant in their interests           | 25. Good at jigsaw puzzles   |
| 13. Has high degree of energy                |  |

Figure 2. *Characteristics of giftedness (Silverman, 1998).*

### 2.1.3 Nurturing gifted children

Online applications are theoretically able to influence the developmental process of a gifted child in a beneficial way. Theories from well-known scholars in the field suggest that nurturing through environmental provision is able to have positive impact on a gifted child.

It is a requirement for the design of an online application to make the enrichment activity as appealing as possible so that the children are more likely to use them and benefit from them, because needs, interests and personality traits of the individual child determine which of the environmental stimuli will receive their attention (Gagné, 2008).

Gagné's model of giftedness (2008) helps to understand the important role that the developmental process plays in transforming gifts into talents. He believes giftedness is an innate, natural ability or potential in one specific or various domains, which can be developed into talents.

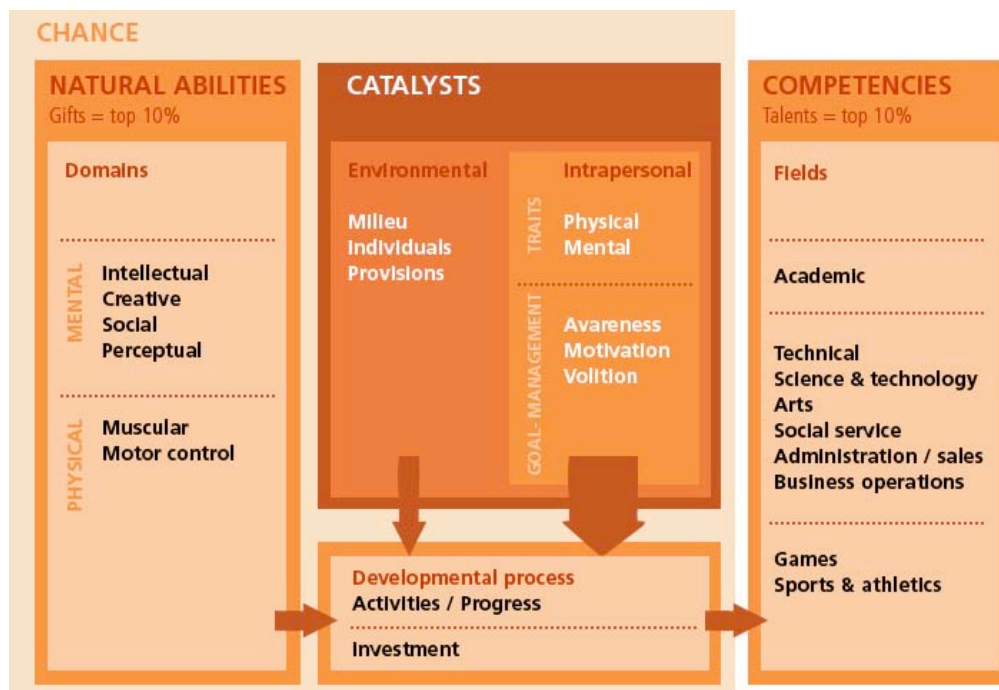


Figure 3. Differentiated model of giftedness and talent DMGT 2.0 (Gagné, 2008).



#### **2.1.4 Educational issues of gifted children**

Online applications might be able to compensate for the insufficient provision in regular classrooms, which has resulted in a high number of gifted students performing below their ability levels, losing their confidence and becoming underachievers. According to Eidson (2008) to get appropriate provision is especially critical for gifted children, because when work is too easy intellectual development is impaired or impossible.

The provision for gifted children within regular classrooms around New Zealand has recently been evaluated by the Education Review Office (ERO). The 2008 report showed, that in 58 percent of schools, programmes and provision were either somewhat, or not at all responsive and appropriate (Ministry of Education, 2008b).

Clark (2002) claims that one of the major barriers to the development of appropriate educational experiences for gifted learners is the traditional age-grouped classroom, because the learners at the top of the class need as much special instruction to continue their growth as do students at the bottom, but they rarely get it. There are some schooling options in New Zealand, which offer instruction on a higher intellectual level. So-called pull-out programmes allow gifted children to spend one day during the week in a specialised programme together with other gifted children. It is widely accepted that the benefits of pull-out programmes are that children can be in their intellectual peer group for one day a week, but that the downside of it is that they might become labelled as being different and miss out on social opportunities on the pull-out day (Porter, 2005).

The main question is how to provide appropriate education for gifted children. Gagné's research (2007) in which he compared several longitudinal studies all across the world found that getting one day per week extension is not enough. He concluded that the only appropriate alternative would be full-time grouping of gifted children. As full-time grouping of gifted children is not an available option in New Zealand, some parents decide to withdraw their children from school and to homeschool them, if they are under the impression that the available regular school education would not be suitable for their children.

### 2.1.5 Planning differentiated instruction

*We only have two hemispheres, and we are doing an excellent job teaching one of them. We need only become more aware of how to reach the other, and we will have happier students, learning more effectively (Silverman, 2005, p.4).*

Understanding differentiation options is relevant for the task of designing online applications, because it gives an indication as to how the content needs to be presented in order to be appealing for the majority of the controversial group of gifted children. Clark (2002) suggests that special instruction for gifted children could be offered, based on a differentiated teaching approach. She describes several ways, in which the regular curriculum could be differentiated for gifted children. Those are: differentiation by acceleration, use of complexity, adding depth, providing novelty, supporting idealism and acknowledging intensity.

Online applications also need to consider gender differences. Saxs' (2005) research recognises innate biologically programmed differences between all girls and boys on the basis of their brains being organised differently and various regions of the brain developing in different sequences in girls compared with boys. He suggests that there cannot be one single educational programme, which suits the needs of boys and girls, because their needs are inherently different from each other, and thus appears to be the biggest problem in primary schooling.

An online application would be successful in helping children to learn, if it allows children to engage both hemispheres of the brain. According to Silverman (2005), planning differentiated learning models for all the different learning styles and intelligences of students is hard to do. She coined the term "visual-spatial learner" in 1981 and claims that the easiest differentiation model to implement would involve distinguishing between visual-spatial and auditory-sequential learning styles. Visual-spatial learners think in pictures rather than in words and are whole-part learners as opposed to step-by-step learners. Silverman's model is based on neuroscientific brain research.

An educational application for gifted children should use visual-spatial rather than

auditive-sequential teaching methods. Research from the Gifted Development Center showed that the number of students who favour a visual-spatial learning style increases with intellect. In schools for gifted they found 70-75% of the students with stronger right hemispheres. Silverman concluded that not only visual-spatial children will benefit from a visual-spatial approach. If auditive-sequential children are engaging their other hemisphere, attention and learning are accelerated (Silverman, 2002). Within the general population about one-third of students are strongly visual-spatial and one-quarter are strongly auditory-sequential (Haas, 2001).

### **2.1.6 Social issues of gifted children**

Despite the previously mentioned educational issues, it might be helpful if an online application would address social issues as well. Yewchuk (1999) describes that gifted children are more at danger of becoming socially isolated, because it is harder for them to find intellectual peers within the same age group. Many gifted children have the social skills, which are necessary for engaging cooperatively with others, but if they do not have peers with whom they can exercise their relationship skills, those might not develop (Porter, 2005).

Porter (2005) suggests that cooperative play that requires joint effort should be fostered in order to engage those who are often isolated. As a method to promote social adjustment Porter recommends that gifted children should be placed with intellectual peers in order to increase the quality of playtime rather than the amount of playdates. She reported that an extreme sense of feeling different from others, even from family members is often experienced by gifted children. High demands and misunderstandings of other children, as well as incompatibility of their play styles hinder gifted children to belong to groups or have lots of friends.

### **2.1.7 Activities for gifted children**

Bloom's Revised Taxonomy, a classification system of six cognitive levels from lower order thinking to higher order thinking, can be used to plan online activities for gifted children. Bloom's Taxonomy and more recently Bloom's Revised Taxonomy (Krathwohl, 2002) has been used by teachers all around the world as a roadmap for planning their lessons across grade levels and topics. These taxonomies are concerned with the cognitive domain, which is described as mental skills, based on knowledge. Other

domains of learning are affective, which is the attitude based on feelings and emotions, or the psychomotor domain, which is manifested through manual or physical skills.

McCabe Movat (2003) recommends that ideal activities for gifted children should stretch them to think at the three highest levels: analyse, evaluate and create. The theory behind all hierarchical levels is that people need to remember, before they can understand; they need to understand, before they can apply what they have learned. They need to be able to apply before they can analyse; they need to be able to analyse before they can evaluate and they need to be able to evaluate before they can create new ideas, thoughts and products.

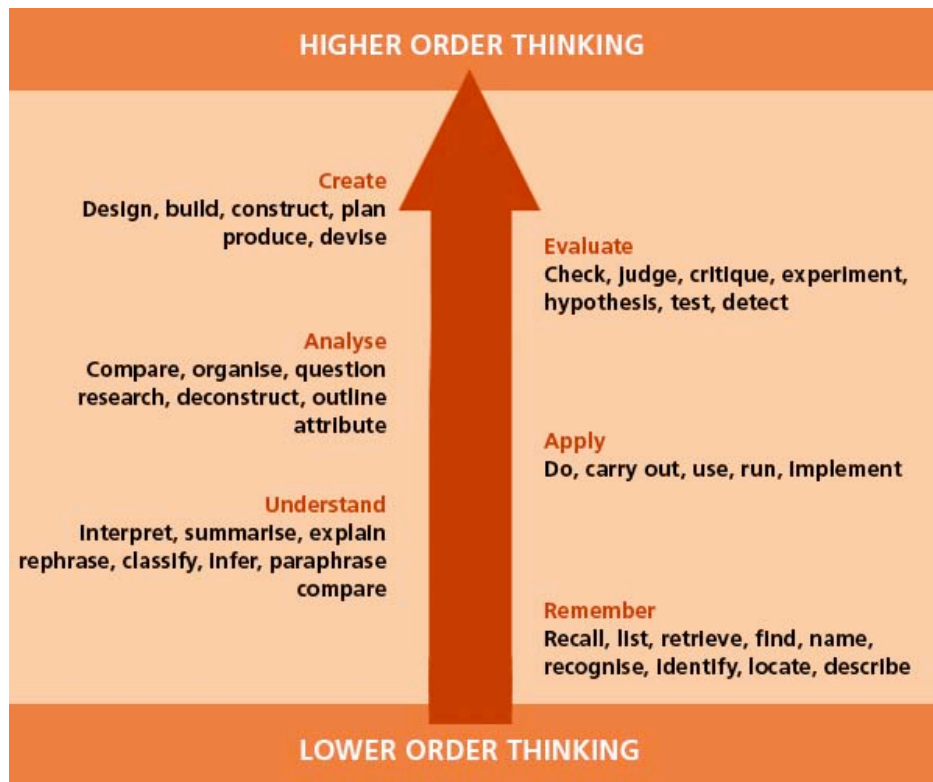


Figure 4. Bloom's Revised Taxonomy of cognitive levels (Krathwohl, 2002).

That Bloom's taxonomy can be successfully applied to online applications was shown by Churches (2008). He matched Bloom's Revised Taxonomy with existing software products and has created a "digital taxonomy" in order to account for the new processes and actions associated with Web 2.0 technologies and increasing ubiquitous computing. Already in Bloom's Revised Taxonomy the highest order thinking skill is

creating, which means "putting the elements together to form a coherent or functional whole and reorganising elements into a new pattern or structure through generating, planning or producing". Also in Churches' (2008) digital taxonomy, creation is described as the highest order thinking task. He uses the following words to describe creation through digital means:

*designing; constructing; inventing; making; programming; mixing; and remixing". Evaluating is described with: "checking; hypothesising; critiquing; experimenting; judging; testing; detecting; monitoring, (Blog/vlog) commenting; reviewing; posting; moderating; collaborating; networking; reflecting; (Alpha & beta) testing; and validating." Analysing is described as "breaking material or concepts into parts, determining how the parts relate or interrelate to one another or to an overall structure or purpose. Mental actions include differentiating, organizing and attributing as well as being able to distinguish between components (Churches, 2008, ¶ 22).*

## **2.2 Literature concerning online applications**

### **2.2.1 Children's media use**

No study about how gifted children use online applications has been reported. This is surprising, because New Zealand children in general are spending continuously more time with new media, in front of computers, game players or the internet (Jordan, 2004; Roberts, Foehr, and Rideout, 2005, cited in Jackson, Low, Gee, & Butler, 2007). Compared to American children, aged 8-18, New Zealand children are more likely to own a computer and to use the internet, but single parents and low socio-economic groups do not have as much access to online applications. New Zealand children use online applications mainly for homework. (Lealand & Zanker, 2003; Reddington, 2005; Wylie, 2001, cited in Jackson, Low, Gee, & Butler, 2007).

### **2.2.2 Differences between child and adult online application usage**

Because of the advanced interests and development of gifted children, it could be assumed, that they would be using the Internet more like adults than like nonidentified children. The internet makes it possible for students to research topics of interest that are not usually covered at school. According to Jacob Nielsen's study, children who use the web for information are in the minority:

*The first big difference between adult and child users today is the reason they use the Internet. The majority of the adult population uses the Web to find information. Adults go to news sites, search engines, content portals, and shopping sites, looking for updated, immediate information that can't be obtained using other media. Other adult goals include communication and community participation. Kids (grades 1-5), on the other hand, go to the Web mainly for entertainment. They look for games, jokes, and content related to their favourite characters and idols. A growing number of kids use the Web for information and communication as well; but for now, they are not in the majority (Nielsen, 2002, p.114).*

This study also found out, that children spent longer times with online applications if they used animation and sound effects and that children were more inclined to search on screens for possibly clickable areas than adults.

### 2.2.3 Multiplayer applications

The main advantage that the online medium offers is the availability of enrichment opportunities 24 hours on seven days in the week and the option to communicate, collaborate and play with the rest of the world.

Not only for adults, multi user virtual environments were also increasingly used by children (Dede, 2004). Research about virtual worlds from KZERO (2008) shows that so far only Lego universe is allowing children in the age group up to ten years to become fully creative and allow them to build environments.

*What's of interest here is the element of content creation that could be on offer to the residents of Lego universe. Very few (possible none) of the under 10's virtual worlds allow third tier creation (first tier: avatar, second tier: objects, third tier: environment). Allowing kids to make buildings etc could be a killer app and something we haven't seen much of (KZERO, 2008).*

Within the current five to 10-year segment, Poptropica is the most popular virtual world, followed by Barbie Girls, and within the 10-13-year segment it is Neopets, followed by Club Penguin (KZERO, 2009).

*A major conclusion, which appears obvious, is that we all want to customise our avatars. Why? Because (just like in the real world) we care about our appearance. We want to look different or at the very least, we want to look as though we've given consideration to how we look. And, let's face it, no-one wants to walk (fly or teleport) around looking like a newbie - the virtual world equivalent of a tourist. The white T-shirt and jeans look might have worked for Nick Kamen in the 1980's Levis commercial but unfortunately doesn't cut the cloth for the avatars of today (KZERO, 2008).*

It might be a considerable option to engage gifted children in creation of avatars and environments.

### 3. RESEARCH METHODS

*Previous chapters pointed out that the intellectual and social needs of gifted children are different from nonidentified children. Because of the advanced development of gifted children, it might be possible that current age-appropriate online applications are not challenging enough intellectually.*

*In order to find out how online applications are designed that appeal to gifted children, it was first considered to observe gifted children using different kinds of applications over a longer amount of time, but due to the limitations of a Masters timeframe this could not be done. A comparative study comparing gifted children with non-gifted children could also not be conducted, because children from the whole population were nonidentified and the researcher was not in the position to judge, which of those children would not be gifted.*

*Instead, a parents' survey was conducted in order to retrieve the required information. The survey was addressed to parents rather than children in order to get their opinion on the benefits of online applications and to track back their media habits until the children were little. In addition, also patterns of first and second graders should be retrieved and it would be difficult to get those children to answer specific questions meaningfully if their writing skills are not yet mature.*

*In order to evaluate if online applications that accommodate those specific intellectual and social needs are appealing to gifted children research through iterative design was conducted and validated.*



### **3.1 Online survey**

As recommended by Purpura (2003), quantitative research methods were used at the beginning to pin down the main parameters of the research. An online questionnaire was considered useful as a data collection method, especially because large numbers of people could be reached in different geographical regions (Sekaran, 2000). The purpose of this survey was to investigate how gifted primary school children in New Zealand are using online applications and to identify their most popular applications.

Survey information was emailed to recognised New Zealand institutes for gifted children. Those institutions forwarded the survey information to their registered parents of gifted children. Given that the questionnaire was targeted to people who have a stake in the topic the length of 23 questions was considered appropriate. Filling in the questionnaire took approximately ten minutes. In all, 93 responses were analysed. The gender distribution between the participants' gifted children was 35 girls (38 percent) and 58 boys (62 percent), aged between five and 13 years. This ratio represents the general gender ratio of children who are referred for assessments to find out if they are gifted, which are 61 percent boys and 39 percent girls from within the general New Zealand population of 52 percent male and 48 percent female (Cathcard, 2009). The most statistically significant responses in this study concerned children aged six to 11 years, with at least four children each per age and gender.

### **3.2 Iterative design**

The second method used was iterative design. In this thesis, the research aim "to design an online application that appeals to gifted children and recognises the identified intellectual and social needs within the New Zealand context" was addressed by establishing a design strategy based on previous investigations and then applying this design strategy to a prototype application. In order to validate the design strategy the prototype application was then tested and findings from testing were used to inform the design strategy and make changes to the prototype application. This process of testing the prototype application and using those findings to alter the design strategy, then applying it again to the prototype application initiated several iteration loops.

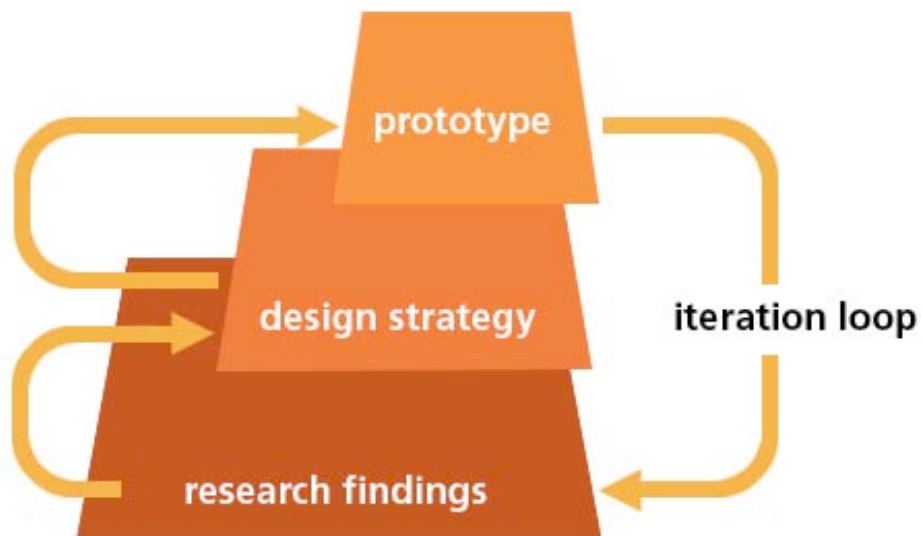


Figure 5. *The iterative design process used in this thesis.*

At first, the researcher tested and improved the prototype application. In addition testing with real users was necessary as validation because designers cannot predict the reactions of actual users, especially not if the users are children (Hanna, Ridsen, & Alexander, 1997). Usertesting was conducted with 12 students (9 boys, 3 girls) aged 8-12 at a recognised New Zealand institution for gifted children. Testing sessions consisted of a 15-minute observation period followed by a five-minute interview with initial structured questions, each with three children at a time.

The process that allows real users to contribute their ideas on how to improve a prototype application as it is being developed is described by Ireland (2003) as participatory design research. This was seen as an appropriate method, because Hanna, Ridsen, & Alexander (1997) state that children in the elementary school age range are easy to include in software testing as they are generally not self-conscious about being observed as they play on the computer. They answer questions and try new things on the computer with ease. In addition, Deasy (2003) states that through observations problems can be “seen”, while interview questions contribute understanding to prior observation.



## 4. SURVEY RESULTS

*Children are a segmented audience and designers need to be sensitive not only to age and gender, but also to their psychological, cognitive and social developmental stages (Singer, 2003). Therefore the online survey investigated how gifted primary school children in New Zealand are using online applications and, amongst other findings, identified their most popular applications. Survey questions were divided into the following categories:*

- 1. General information about the surveyed children and their media access: closed-ended questions about age, gender, favourite activities and media access at home, and open-ended questions about their specific domain of giftedness and how it was identified were asked to identify patterns in the students' choice of online applications in relationship to those aspects and to pin down constraints for this research.*
- 2. Perception of parents on benefits of online applications: open-ended questions were asked to elicit the respondent's own perceptions about what features make those applications appropriate for the advanced development of gifted children.*
- 3. Current online application usage: open-ended questions were asked to identify online and offline gaming and non-gaming applications and their purpose of use.*
- 4. Past online applications usage: open-ended and closed-ended questions were asked to determine the starting age of children pursuing different online activities and identify multiplayer game sites.*
- 5. Parents' interactive media usage at home: closed-ended questions were asked about parents' media habits in order to find relationships between child and parent media usage.*
- 6. As an option parents could provide their email address in order to receive findings of this study after completion of this project. Those data were listed in a different file in order to ensure anonymity of the participants.*

## 4.1 How gifted children use online applications

### 4.1.1 General information about gifted children's media access

A question about the accessibility of interactive media at home was asked in order to assess which platform an interactive application should be designed, and to decide if it makes sense to design an application for a static computer rather than a mobile application or game player. The gifted children in this study had access to a variety of interactive media at home, but the computer was by far the most accessible device. Most children surveyed had access to a computer compared to other devices like game players, hand-held players and cellphones. It is not expected that those numbers will change dramatically within the near future, because children usually do not have access to expensive, cutting-edge technology in the same way as adults in business and professional sectors do. Children often use computers that have been handed down by parents and siblings to reduce expenses (Nielsen, 2002).

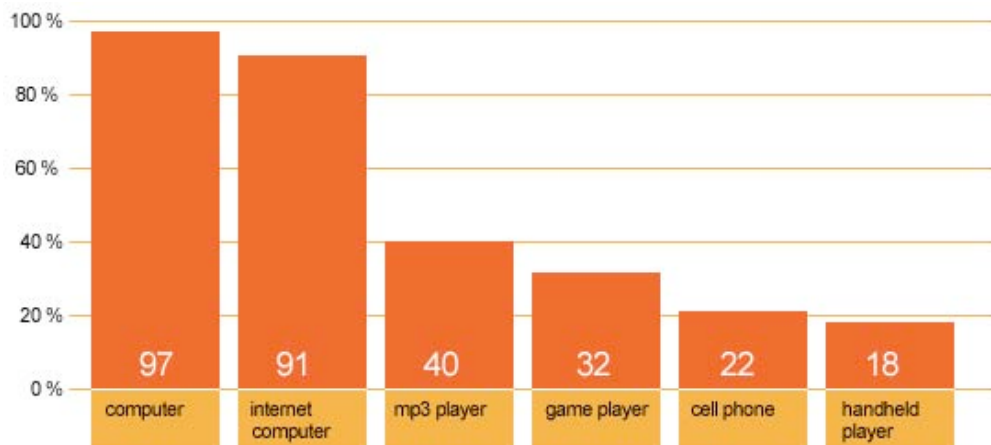


Figure 6. *Interactive media accessible at home, percentage of children.*

In general, boys spent more time with interactive media (1.2 hours per weekday and 1.9 hours per weekend/holiday day) than girls (0.6 hours per weekday and 1.2 hours per weekend/holiday day). While most families had rules about the time, which is spent on interactive media (76 percent) and games or online applications children could use (70 percent), or rules about age appropriateness (59 percent), only a few (six percent) had no rules.

A question about the children's favourite activities was asked in order to get an insight into the areas, which are liked and disliked by gifted children. The children's favourite activities were grouped in the following way based on Gardner's (1999) multiple intelligences concept:

- Verbal/linguistic intelligence (reading, writing, speaking)
- Logical/mathematical skills (working with numbers, science)
- Spatial/artistic skills (painting, drawing, building)
- Musical intelligence (making music, listening to music)
- Bodily/kinaesthetic skills (sports and dance)
- Interpersonal/social intelligence (working and interacting with others).

Gardner's most recent version of his multiple intelligences concept consists of nine different intelligences. However, in the survey only six of them were taken into account because a question put to parents to indicate if their children had a high level of intrapersonal, natural or existentialist intelligence was found to be too difficult to answer meaningfully.

The researcher intended to gather data that would allow conclusions to be drawn regarding links between media choices and intelligences. However, most children liked more than one activity and preferred many different combinations of activities, so that media choices could not be linked back to different intelligences.

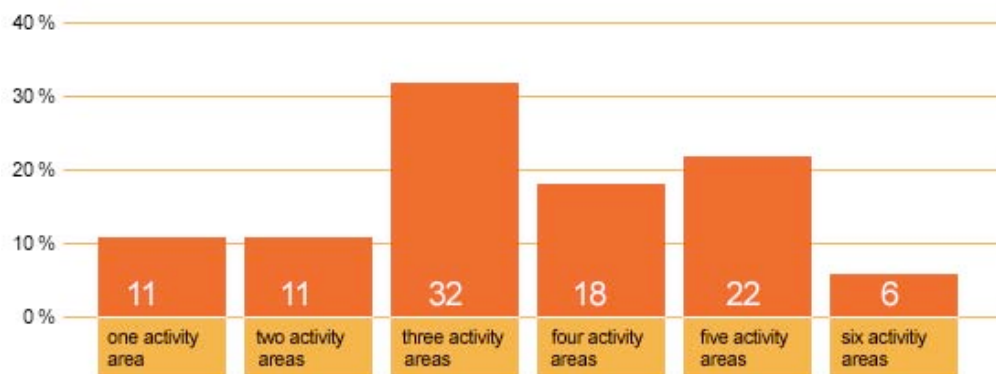


Figure 7. *Distribution of different activity areas, percentage of children.*

The most favourite activity across both genders was verbal/linguistic followed by spatial/artistic. The least favourite activity across both genders was interpersonal and social interaction.

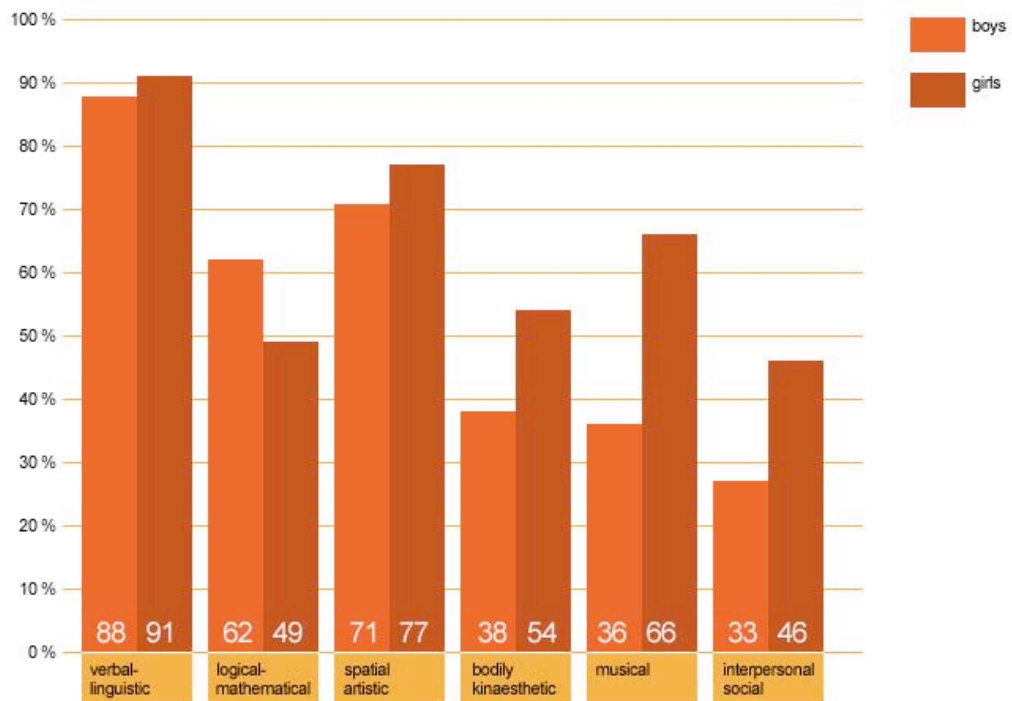


Figure 8. *Favourite categories across boys and girls, percentage of children.*

A more differentiated way of looking at the retrieved data revealed that it might not make sense to group activities into Gardner's categories because the preference for single activities was not evenly distributed amongst all possible activities within the categories. For example, within the verbal/linguistic category reading was by far the most liked activity amongst both genders, speaking was less liked by both genders and writing was liked by some girls, but only a few boys.

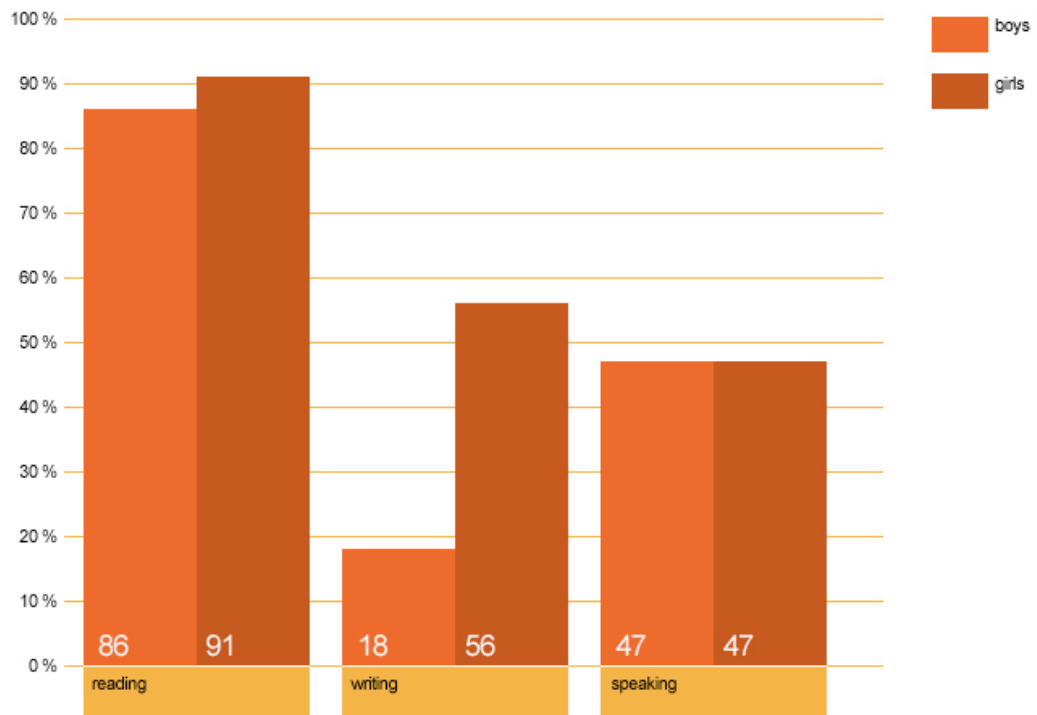


Figure 9. *Linguistic activities across boys and girls.*

Even if it might be harder for gifted children to find intellectual peers and they might sometimes feel alienated because they are ahead of everyone else in their class, there was no indication that gifted primary school children in New Zealand had general problems finding other children to play with after school. It is possible the numbers of children in after-school care could skew this statistic about after school playtime with other children, because it was not asked how many of those children were in after-school care while playing with other children.



Figure 10. *After school playtime with other children, percentage of children.*



#### **4.1.2 Perception of parents on benefits of online applications**

Data was retrieved on specific questions concerning interactive media and their usefulness for the development of gifted children. The vast majority of parents listed benefits such as providing a challenging and competitive environment, relaxation and recreation, learning functions on the computer or topics of their interest, improved hand-eye coordination and mental stimulus. Most of the parents who mentioned detriments did not like computers themselves and referred to them as "prescribed entertainment". Others complained about mood issues after playing on the computer and addictive behaviour.

Data was also gathered on the features an ideal application would have. Many parents requested that ideal applications should be educational and fun, provide different levels and be age appropriate. In addition the survey provided an insight into the activities the children were interested in and a list of popular online applications and games.

It was surprising that no parent found video games and online applications that focused on mainly addressing social needs as helpful for their child's development. Even parents whose children never played with other children after school desired both educational and social opportunities for their children. This could be due to parents wanting to compensate the lack of enrichment within the regular classroom. The parents may not be aware of the social potential of virtual worlds (Seiter, 2005) or they might be afraid that their children would be unsafe while socialising online with strangers (F-Secure, 2008; Center for the Digital Future, 2008). This type of interaction with others was the least favourite activity amongst both genders (identified in this survey). Also, parents may not consider social networking as relevant for the surveyed agegroup. There may also be some reluctance amongst parents for their children to be using a computer to socialise, rather than experiencing the benefits of direct contact with their friends.

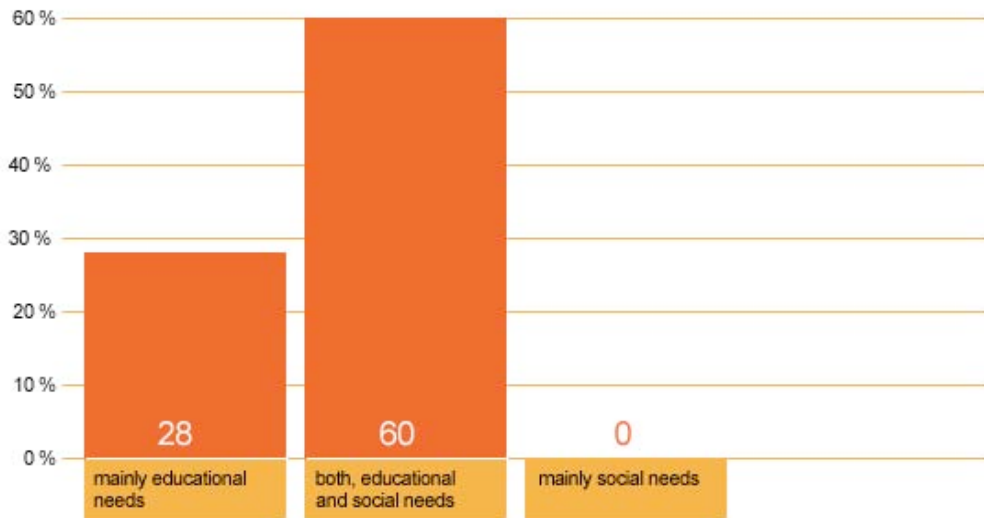


Figure 11. Needs that should be addressed in interactive applications, percentage of parents.

#### 4.1.3 Past and current online application usage

In contrast to Nielsen’s study (as described in section 2.2.2) the majority of gifted children from this study used the full potential of the internet. They used non-gaming online applications for information, mainly for their personal interests and less for homework. Popular non-gaming online applications were Google (38 percent), Wikipedia (27 percent) and YouTube (19 percent).

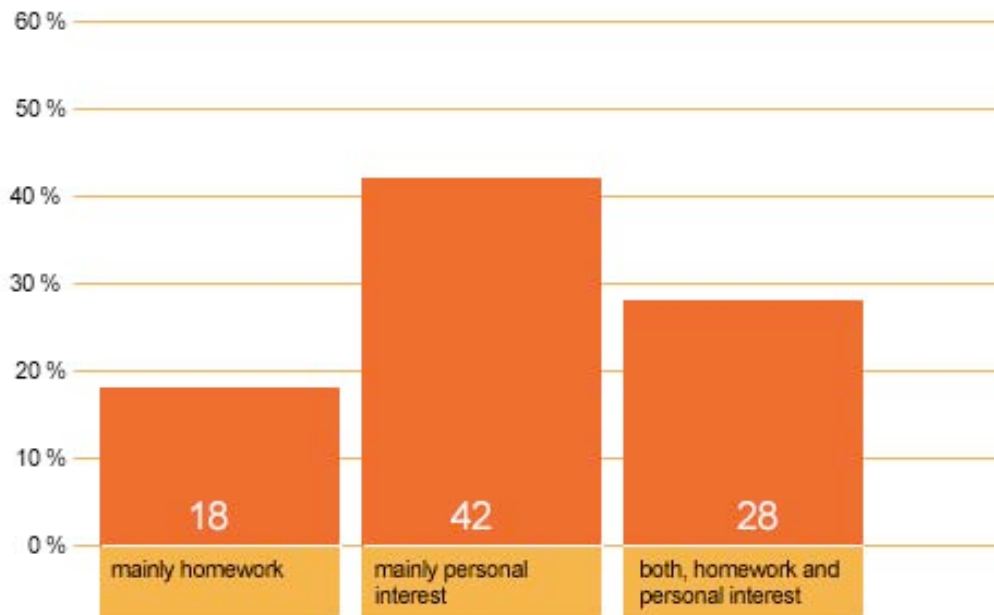


Figure 12. *Gifted children's purpose for using non-gaming online applications, percentage of children.*

Respondents indicated that online applications for children were first used on average at the age of five and-a-half years. The youngest user had been two years old. Compared with the study by Nielsen, (as described in section 2.2.2), there was no indication that gifted children would in general start using interactive media earlier than nonidentified children which usually start accessing the internet with other family members around the time they start primary school (Nielsen, 2002).

The list of the 11 most popular gaming online applications contained seven Massive Multiplayer Online Role-Playing Games (MMORPG's). It is possible that engaging in activities together with others and competing against others might make online applications attractive to gifted children, even if the activities do not address higher order thinking skills.

Gifted children used other online applications as well. The survey provided also a list of games, which addressed higher order thinking skills, such as [www.incredibots.com](http://www.incredibots.com) or <http://scratch.mit.edu>, but because different children preferred different sites or different games, those games were just listed once and did not show up in the survey popularity ranking. In comparison, games, which addressed higher order thinking skills, did not have the multiplayer functionality.

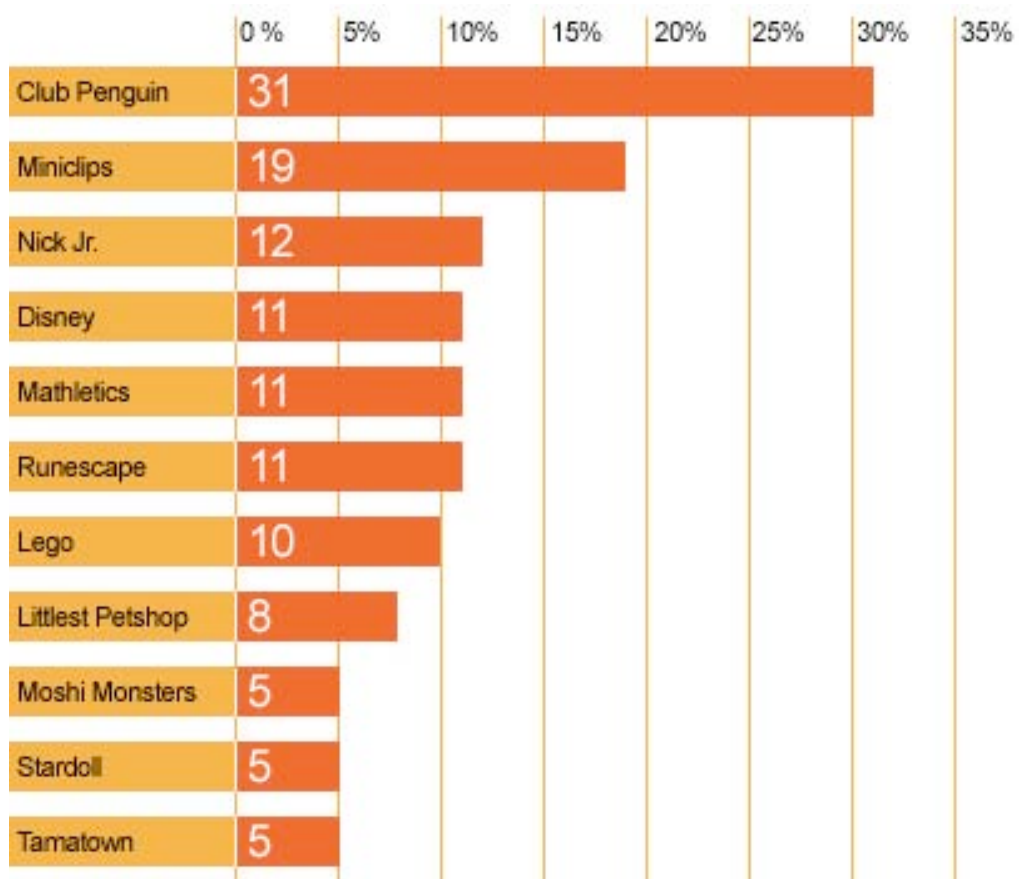


Figure 13. *Eleven most popular gaming online applications, percentage of children who used them.*

*Club Penguin: [www.clubpenguin.com](http://www.clubpenguin.com); Miniclips: [www.miniclips.com](http://www.miniclips.com); Nick Jr: [www.nicknz.co.nz](http://www.nicknz.co.nz), [www.nickjr.com](http://www.nickjr.com); Disney: [www.disney.com](http://www.disney.com); Mathletics: [www.mathletics.com](http://www.mathletics.com); Runescape: [www.runescape.com](http://www.runescape.com); Lego: [www.lego.com](http://www.lego.com); Littlest Petshop: [www.hasbro.com/littlestpetshop](http://www.hasbro.com/littlestpetshop); Moshi Monsters: [www.moshimonsters.com](http://www.moshimonsters.com); Stardoll: [www.stardoll.com](http://www.stardoll.com); Tamatown: [www.tamatown.com](http://www.tamatown.com).*

## 4.2 Popular applications

### 4.2.1 Club Penguin



Figure 14. Club Penguin homepage.

The most popular online application for gifted children surveyed was Club Penguin. Club Penguin was established in 2005 and has over 12 million registered accounts. The application was ranked in 2008 as one of the ten fastest growing sites in the UK (Nielsen Online, 2008). This could mean that it appeals even more to nonidentified children. The target audience for Club Penguin is children between six and 14 years. In Club Penguin children can access a wide variety of places, for example a town, plaza, cove, dojo courtyard, beach or ski hill. In each of those places, children can chat or play casual games with others and earn coins through game play. With a regular registration, those coins can only be spent on a few items. If children want to get full access to items like clothing, surfboards, pets, pet furniture and other items for their igloos, they have to purchase a membership at approximately seven New Zealand dollars a month.



Figure 15. *Non-member penguins and member penguins in Club Penguin.*

Even if the two biggest activities in Club Penguin are playing games and buying accessories, there are plenty of other options like chatting, reading the newspaper and taking part on missions or special events. The combination of multiple activities and choices add complexity and therefore holds the child's attention for a long period of time. This combination of options might be significantly appealing factor of the application for gifted children.

#### **4.2.2 Mathletics**

Another multiplayer online game, which was ranked fourth in the study together with Disney and RuneScape, was Mathletics. According to the Mathletics online application, Mathletics is Australasia's most used educational online application. Worldwide more than 3,000 schools are using Mathletics. Individual and school licenses are available for around two New Zealand dollars per week. Mathletics covers the full year 1-13 curriculum. In "Live Mathletics" children can challenge each other around the globe in real time maths competitions or can practise basic facts at their own pace. Step by step animated tutorials offer help if the methods for arriving at an answer are not clear.



Figure 16. *Mathletics homepage.*

With regard to gifted education, Mathletics might be suitable for a number of reasons, firstly because teachers can subscribe their whole classes to pre-defined exercises and tasks. This can reduce the workload of teachers and free up some time for them, which they could use for the development of problem solving sessions and higher order thinking tasks. Secondly, it is a suitable tool for encouraging gifted children in maths to do repetitive rote tasks and improve speed and accuracy in a fun way. Thirdly, students are motivated and involved through competition. If they do well on Mathletics, their self-esteem could potentially grow, because they can showcase their achievement and help their class to get a good ranking position on the Mathletics homepage. Self-esteem has been identified by Riley (1999) to be a significant issue, which can be raised through competitions. To get this opportunity to perform to the best of their ability may be particularly important for gifted children in New Zealand with its egalitarian culture and tall poppy syndrome.

#### 4.2.3 Features and required skills

When children are visiting a virtual world, they use a wide range of lower order thinking skills. They have to remember where certain information or a game is to be found and understand how to navigate to it. They can apply their reading, writing and social skills during conversation with other children. They can make comparisons of their own

performance or character with those of other children and judge how they are performing. High score lists as in Mathletics cultivate a competitive environment. In addition, children have a space, in which they can make decisions within the limited space of the virtual world and are fully responsible for themselves.

The majority of gifted children's most popular gaming online applications do not address higher order thinking skills and do not allow much creativity. They could be listed in the form criticised by parents as "prescribed entertainment". The multiplayer games have a common underlying game pattern: children can customise their character as well as the living space of their character, often in combination with caring for a virtual pet. Consumerism is the dominating theme in these virtual worlds besides social activities. Children can earn virtual currency like coins (Club Penguin), rocks (Moshimonsters) or points (Mathletics, Tamatown) through gameplay either with others or by themselves. They have several options to communicate and compete with other children, make friends, add them to their buddy lists or rank their creative work. The online applications require registration but are free to access and play. Until the children become fully registered and paying members, or have bought a compulsory physical toy (Littlest Petshop, Tamatown), they are only allowed to buy a very limited number of items and might not be able to access all features.

#### **4.2.4 Screen resolution**

Seven out of 11 popular homepages were designed for non-scrolling. According to Jacob Nielsen's study "Usability of Websites for Children" (2002), children scrolled less than adult users, which caused some users to miss important content without realising it. Nielsen (2002) also states that adult users didn't scroll much 10 years ago either, but by the end of 2001 more people were scrolling down two or three screens to find more information. It is possible that children may also change their behaviour as they become more familiar with the medium.





Figure 17. Non-scrolling homepage: Disney.

#### 4.2.5 Layout and navigation

The most popular gaming portals which offered lots of different gaming options presented themselves in a clearly structured, well defined layout, so that children could find interesting games within a short amount of time. The content of each site is communicated through the arrangement, size, colour and proportions of text, graphics and pictures. A good layout guides the eye in order to understand groupings and differentiate important from less important information.

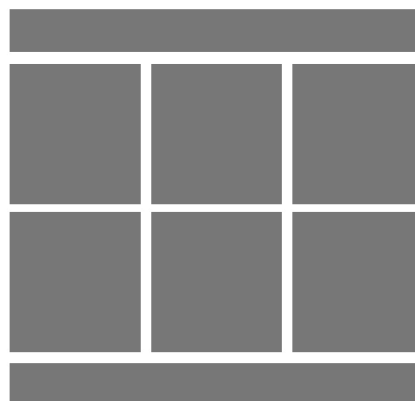


Figure 18. Clearly structured layout: Lego online application and underlying simple grid.

#### 4.2.6 Presentation of text

Legibility is fundamental to typographic design. Legibility refers to how easy it is to distinguish characters from each other. Most of the popular applications used simple letterforms and relatively large fonts. In a study amongst primary school children in the UK (Walker, 2005) findings suggested that there is little significant difference in children's reading performance when Century (a serified typeface) is compared with Gill (a sans serif typeface), but typefaces can have an important effect on how children perceive a text, and hence their motivation to read. Associations can be strong, and there seems to be some comfort for young children in reading things that look familiar or 'normal'.

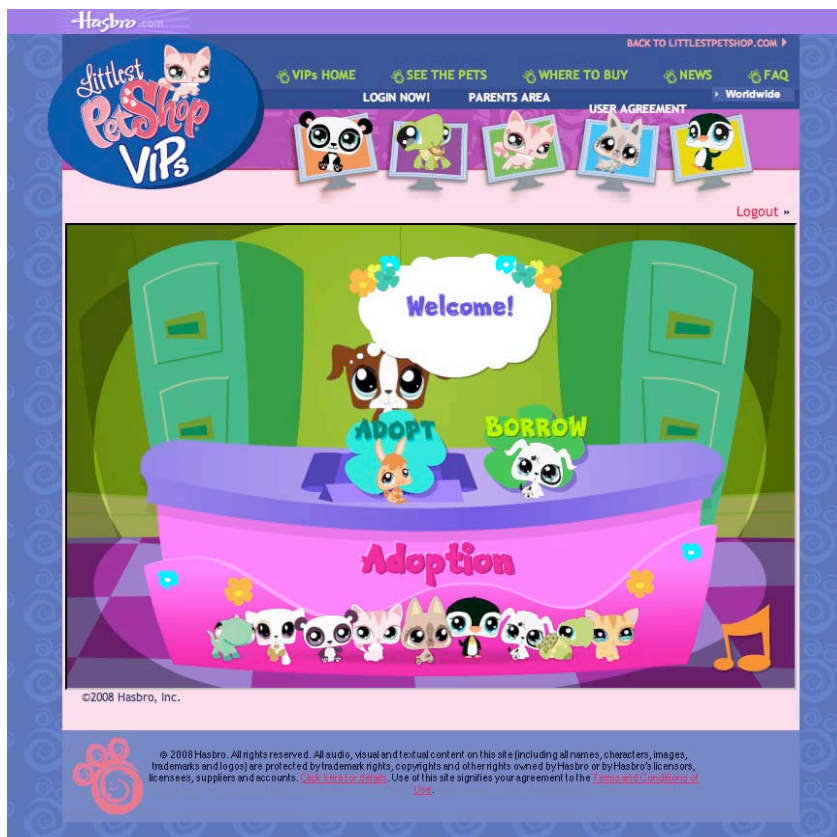


Figure 19. *Typography in Littlest Pet Shop online application.*

Similarly, readability is also a fundamental element. It relates to reading ease and is a matter of reading level, length of text and the giving of explicit directions. Amongst the popular applications, there was only a very small portion of text and more focus on

images. Dialogues with users and game explanations were mostly split over many different screens requiring the user to click to continue from one screen to the next.



Figure 20. *Typography in RuneScape tutorial.*

#### 4.2.7 Avatar customisation

A popular feature amongst MMORPGs is an avatar construction kit in which children can build their own avatars and buy or earn equipment for it. This feature does not allow full creativity, because children can only choose between a few options and are limited by predefined features.

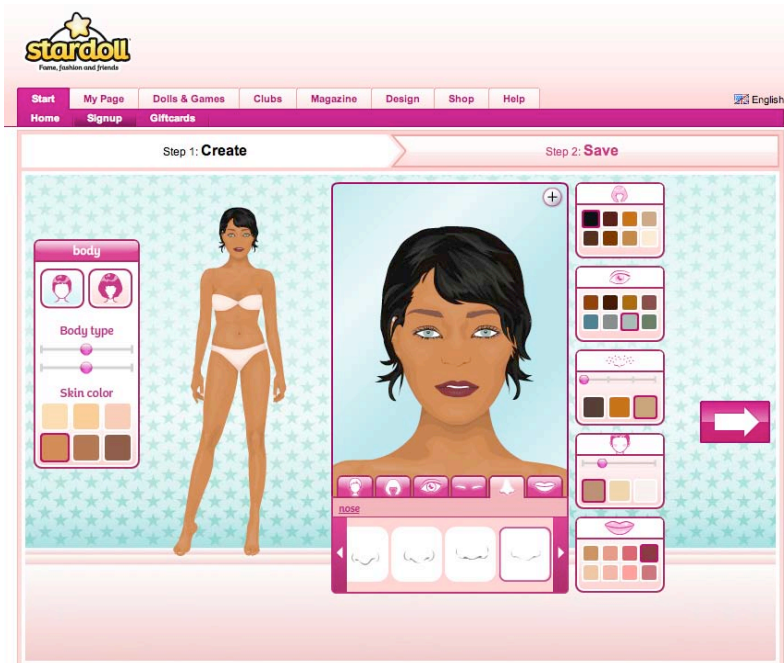


Figure 21. Avatar construction in Stardoll.

#### 4.2.8 Visual appearance

All popular sites seem to be different from each other in their graphical design, appearance and character design, but they all have a professional look and feel. Bright colours were used to attract attention without being overly colourful. Animations and sound were essential elements of the sites.



Figure 22. Graphics on Moshi monsters.



## 5. PROTOTYPE DESIGN

*The design phase consisted of conceptualisation, design, realisation and validation of a prototype online application. The conceptual process started with considerations such as choosing a theme for the prototype application and comparing examples from the field. These went on to inform the design strategy. The design strategy was also informed by previous investigations such as the background literature and survey results. The design of the prototype application typozilla was then developed and improved through reflective design practice. Finally, it was tested through user observations and user interviews, if the main aim of the prototype application was achieved.*



## **5.1 Theme**

### **5.1.1 Selection of the topic**

There were many appropriate topics for a prototype application for gifted children. The prototype application was considered as a way of seeing whether the design of an application based on an explicit design strategy is going to make this application appealing for gifted children.

In order to choose a representative area, an activity was chosen, which was not very popular amongst most gifted children from the survey. This was due to the assumption that if children were asked to do activities they like doing in general they would be more likely to find this application appealing. Therefore the prototype application addresses a real problem for some gifted children, which is writing.

In general the task of writing comprises two sub-tasks. One part of it is thought processing such as recording and communication of ideas in order to make them understandable for others, the second part is the manual act of writing, which is the motor skill, involved in putting letters or symbols on a surface. The prototype application focuses on the second part, the motor skill of writing on a computer keyboard. If children are fluent on a keyboard, they might become less resistant to writing in general, because they are able to master half of the whole task already. Therefore this project tries to engage gifted children in touch-typing (typing with ten fingers) activities. It is intended as a means to an end.

### **5.1.2 Reasons for writing problems**

Children who have many gifts might rarely need to make an effort and might find writing an effort (St. George, 2009). Gifted children often dislike handwriting because their hands cannot move as quickly as their minds (Porter, 2005). Silverman found, that children who start underachieving (achieving below their potential) in the first few years of school often have problems with writing. In order to solve this problem, she suggested using a keyboard for assignments (Silverman, 2009a). This is also supported by Porter (2005) and St. George (2009).

St. George suggested while using a keyboard, children still need to acquire fine motor skills, but the benefit of writing on a computer is that the text turns out to be more legible and therefore more satisfactory for the writer and also more appealing for the reader. It is especially important for many perfectionistic gifted children that they will get the chance that their writing comes across as intended. If they assume that their written work will not look any good they are not going to try it again. They will acquire avoidance strategies which are very hard to resolve (St. George, 2009).

As Cathcart (2009) stated, another reason for gifted children not to write is that they do not understand why they should write. They might not see the necessity and benefit of writing. Especially visual-spatial children might not feel comfortable with the process of bringing their holistic pictures, which they have in their brains, into a linear sequence of written words. Einstein, the famous mathematician, was a visual-spatial learner, too. He described that in his thought process not only written, but also spoken words are not important:

*Words or...language, as they are written or spoken, do not seem to play any role in my mechanism of thought. The physical entities, which seem to serve as elements of thought are certain signs and more or less clear images... The above-mentioned elements are, in my case, of visual and some of muscular type (Einstein, 1979, cited in Golon, 2008, p. 8).*

Visual-spatial thinking happens much quicker than auditive-sequential thinking. This is because complex stories can get represented by just one single image. While thinking, gifted visual-spatial children are producing picture after picture. This process happens sometimes so quickly that the children are not aware of their thoughts so that they are even more unable to capture their thoughts in writing (Silverman, 2002).

### **5.1.3 Educational view on touch-typing**

From an educational point of view, touch-typing is an important skill as it not only improves fine-motor skills and engages both hemispheres of the brain, but also develops a keyboarding proficiency two to three times of the average handwriting speed. Therefore touch-typing becomes an aid to improving writing skills (Zeitz, 2006). Because touch-typing is not widely taught in schools, there is no agreement about at which age children should start learning to touch-type. Ceceri (2009) states that it is important to teach keyboard skills early in order to prevent incorrect or ineffective



typing to become bad practice:

*Educators disagree about the best age to teach touch-typing. There is even disagreement about whether keyboarding should be formally taught at all, especially in elementary school. Once kids have started typing on their own, however, it's difficult, if not impossible, to correct their "bad habits." On the other hand, starting typing instruction before kids have developed the discipline or dexterity to learn it is an exercise in futility (Ceceri, 2009, ¶ 2).*

The New Zealand Curriculum does not require touch-typing to be taught. However, schools are encouraged by the Ministry of Education to consider, within the direction set by the New Zealand Curriculum, the learning needs of their students. It may be that touch-typing will be considered a useful skill by many. If schools choose to teach it, this instruction can take place at all levels from year one on (Arcus, C., personal communication with the Ministry of Education, May 11, 2009).

## 5.2 Online touch-typing applications

### 5.2.1 Traditional approaches

In traditional applications like Mavis Beacon, BBC Dance Mat Typing or Typershark children gradually build up their skills, starting with the home row and adding two more fingers at a time per level. Doing this, learners get instructions in picture form on where to place which finger on the keyboard. In addition, they are providing games to reinforce lessons and their online applications often feature scoreboards listing speed and accuracy and other ways to track individual progress.

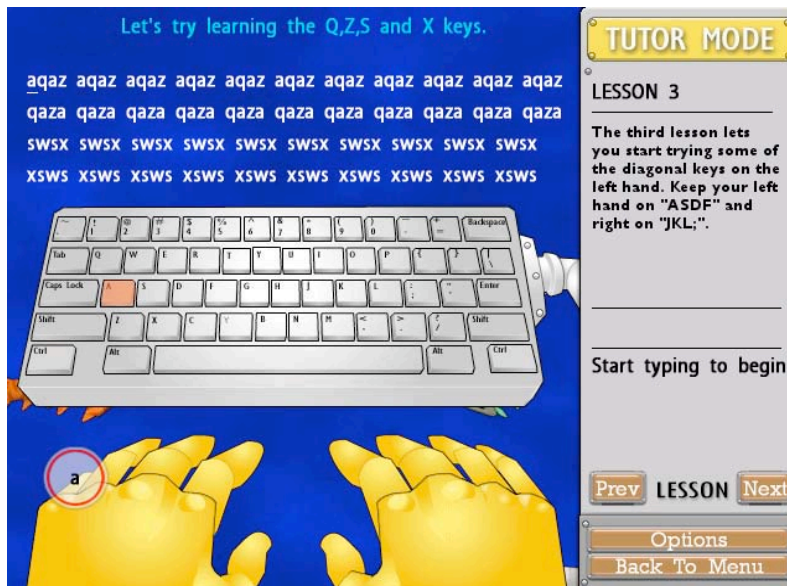


Figure 23. Traditional touch-typing application Typershark.

One of the leaders in commercial typing products, *Mavis Beacon Teaches Typing*, ([www.broderbund.com](http://www.broderbund.com)) mentions on their homepage the following child friendly features:

- 12 fun and challenging games to keep kids motivated.
- Fun practice sessions including IM/text messages and emoticons.
- Nursery rhymes and excerpts from classic books and stories including Peter Pan, Alice in Wonderland and Little Women.
- Capabilities to import and listen to your favorite MP3 files while you type.

An elegant graphical approach is offered from typingweb ([www.typingweb.com](http://www.typingweb.com)). This program stores mistakes in the form of problem keys and displays them graphically in the form of an increasing red shade of the key, which were typed wrong. Users have to complete a level with 90% accuracy in order to be allowed to proceed to the next level. After every assessment, the program brings in more keys, which were typed wrong frequently.

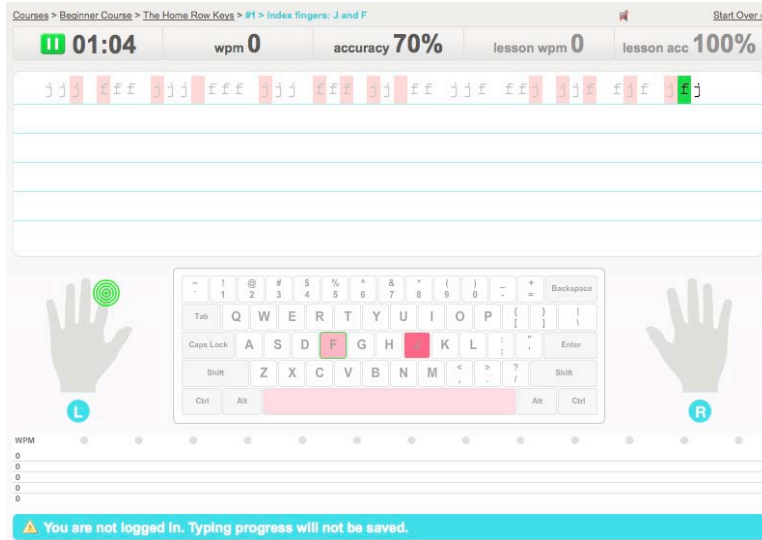


Figure 24. *Typingweb online application.*

### 5.2.2 TypeRacer

The only multiplayer real-time touch-type application so far on the net is TypeRacer ([www.typeracer.com](http://www.typeracer.com)). In TypeRacer player are cars, which go quicker the faster the player types. Player can either practice by themselves or invite known or unknown others to compete. A main navigation problem in TypeRacer is that users cannot continue typing once they made a mistake. They first need to correct the typo. Another problem in TypeRacer is, that the text which needs to be typed is not suitable for general audience.

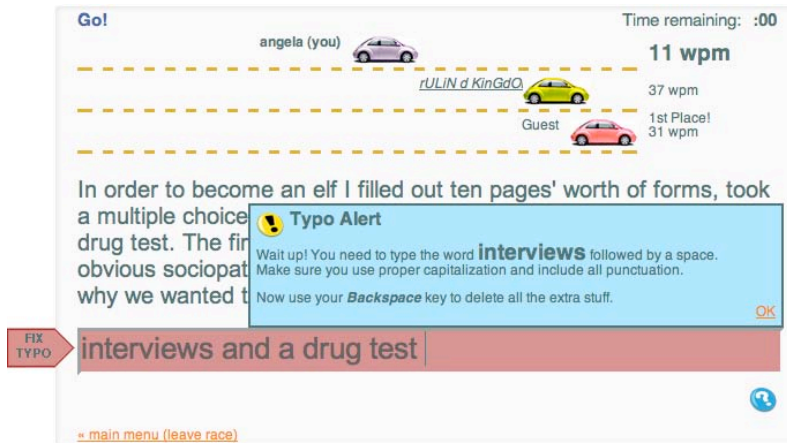


Figure 25. TypeRacer typo warning message.

### 5.2.3 Almena method

A completely different approach to touch-typing is the Almena method. This method claims to teach all 26 letters of the alphabet in only one lesson. Almena King developed a series of mnemonic jingles to assist in remembering key locations. Such a jingle could be: Quiet Aunt Zelda - Want Something Extra – Every Dollar Counts – Run From Vicky – To get Betty. Once someone has learned the jingles, they should be able to remember their key locations.



Figure 26. Almena touch-typing jingles.

#### 5.2.4 The typing of the Dead

“The typing of the Dead” is a touch-typing application, which claims to motivate boys to keyboard. In this game the player has to fight against zombies and monsters by typing sentences correctly. This game might appeal to certain boys, but might be too violent for others.

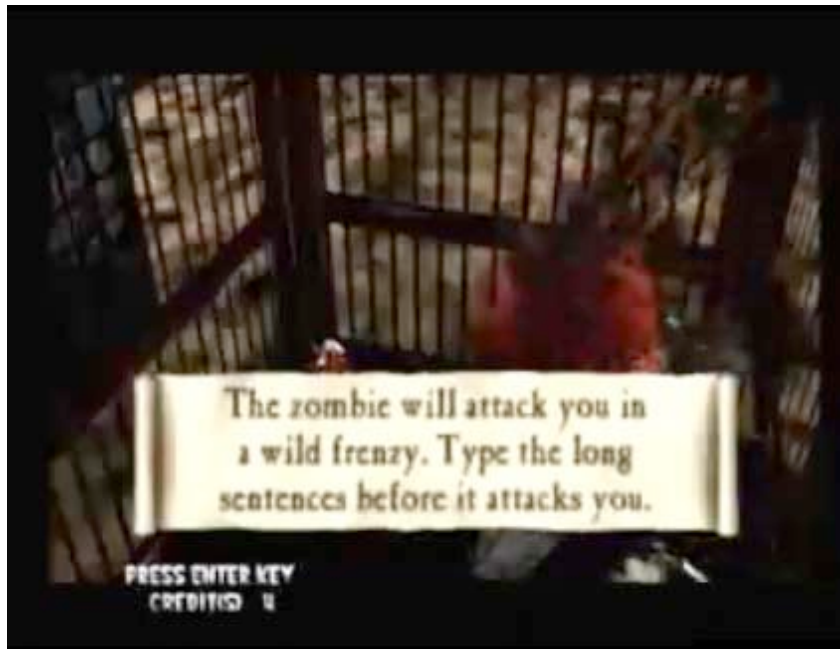


Figure 27. *The typing of the Dead.*

## 5.3 Design strategy

### 5.3.1 The name typozilla

Once it was decided that the online application would be about touch-typing, an appropriate name for the application and the internet domain was considered. Ideally this name would reflect the typing activity and suggest that it is a helpful application, and at the same time be appealing for children. Starting off with word combinations based on typing, such as “typingking” and “touchtypet”, a more open search also considered names made from the words letter, such as “letterama”, “letterillo” or “littera” (latin = letters of the alphabet) and the word “typo”, such as “typorama”, “typospace”, “typoworld”, “typotypo”, “typorium”, “typophant”, “typoking” and “typorilla”, before the name “typozilla” was chosen.

The name typozilla is made out of two words, one is “typo”, which describes a typographical error and the other is “Godzilla”, a well-known, giant Japanese monster, which is powerful in fighting. The combination of the two words should suggest a fight against typos. Children using typozilla should become as strong and powerful as Godzilla when they are fighting against typos. Typozilla also has the allegory of stomping hands on the keyboard, like Godzilla stomping through the city.



Figure 28. *Godzilla statue* ([http://brian.carnell.com/life\\_stream/items/view/12956](http://brian.carnell.com/life_stream/items/view/12956)).

### 5.3.2 Concept for touch-typing application

On the basis of previous investigations, major aspects were summarised in order to define a design strategy that allows creating a touch-typing application, which is appealing for gifted children.

Based on the literature review from scholars in the field of gifted education, it was assumed that the touch-typing application would be suitable for the intellectual and social needs of gifted children, if it:

- stimulates higher order thinking
- is suitable for a visual-spatial learning style
- fosters contact with other gifted children
- is gender balanced.

On the basis of parents' views (from the survey) on what features ideal online applications for their children should have, it was assumed that the application would be useful for the advanced interests of gifted children if it:

- is educational
- is challenging and competitive
- improves hand-eye coordination
- is fun
- provides different levels
- is age appropriate.

Based on the common characteristics of popular gaming applications (from the survey), it was assumed that gifted children would find the touch-typing application appealing if it has the following features:

- multiplayer functionality
- full screen resolution
- clearly structured layout and intuitive navigation
- little text
- changeable avatars
- aesthetic visual appearance.

### 5.3.3 Typozilla overview

Typozilla is an online touch-typing game with four main areas:

1. learning to touch-type
2. creation of images with letters
3. competition against other players
4. the customisation area "my typozilla".

Children can communicate, play and learn with each other through the multiplayer functionality.

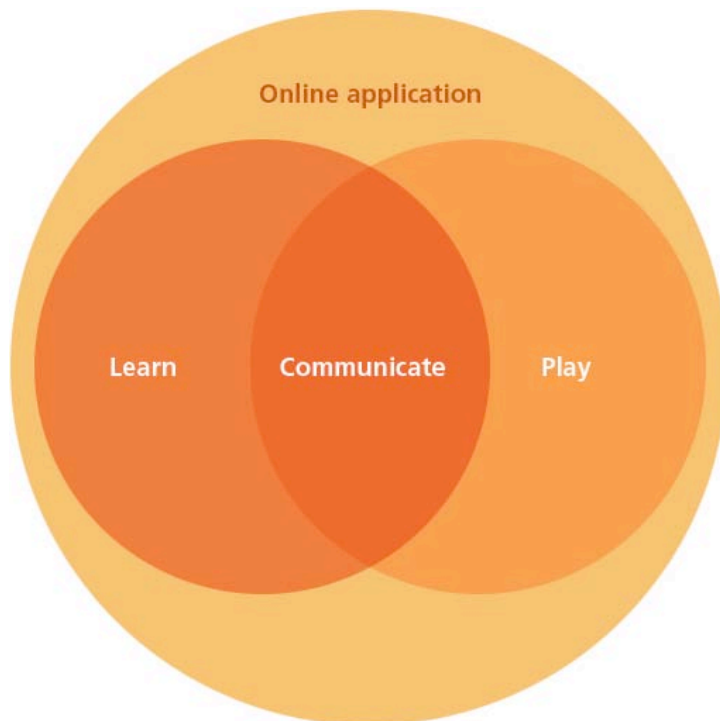


Figure 29. *Proposed main activities within an online touch-typing application for gifted children.*

In order to be able to use typozilla, an account needs to be created. At first users are asked to choose an avatar, then choose name and password and accept the rules of usage.





Figure 30. *Typozilla homepage.*



Figure 31. *Typozilla avatar selection.*

1. Your avatar:

change

2. Name your avatar & choose a password longer than 6 characters

Mary  
name  
password  
confirm password

typozilla

Typozilla is a free multiplayer game by Angela Blachnitzky. [More info](#)

Figure 32. Typozilla name and password selection.

1. Your avatar:

change

2. Your name and password

Mary  
name  
password  
change

3. Read and accept the rules and conditions of use

This typozilla website has been developed as partial fulfillment of a Master in design by Angela Blachnitzky through the Institute of Communication Design, Massey University Wellington, New Zealand.

This website is currently under construction and in test-mode. All accounts will be deleted on a regular basis and all your virtual coins, pictures and user data will be lost.

All information and content are copyrighted property and may not be used, not in parts, or otherwise, without written permission from Angela Blachnitzky. The site is only for personal use. You may not use this site for commercial purposes.

typozilla

Typozilla is a free multiplayer game by Angela Blachnitzky. [More info](#)

Figure 33. Typozilla conditions of use.

After login they come to the main learning area, where they can meet and communicate with other players and access learning units.



Figure 34. Main learning area in typozilla.



Figure 35. Example learning unit in typozilla.

In the creation area, children can make their own images by using different letters, sizes, colours and font faces. The created images will be stored in a database and used as a basis for competitions.

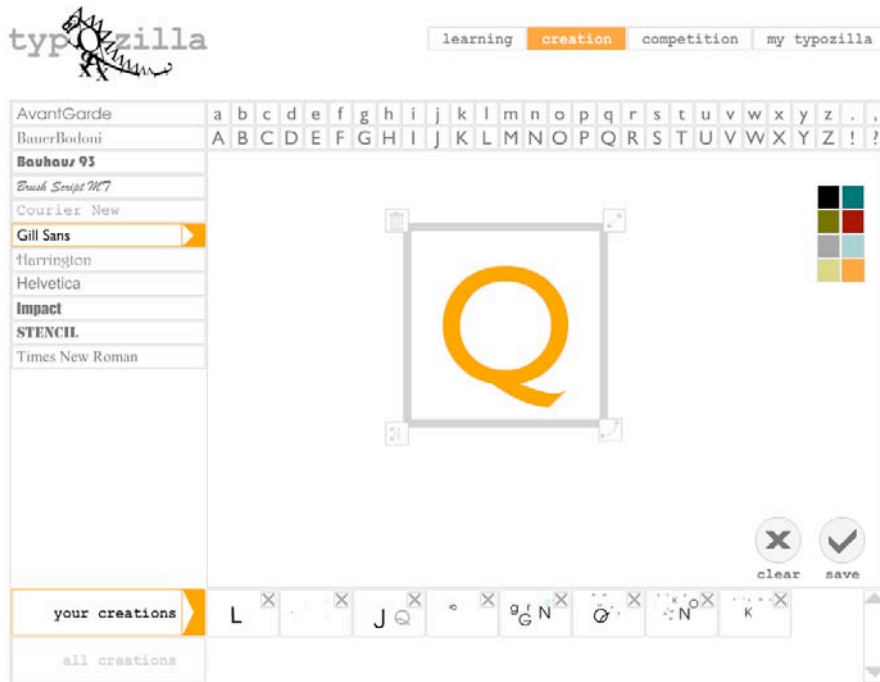


Figure 36. Typozilla creation area.

In the competition area, children can compete with other players all around the world or against the computer. They have to type the letters, which were used in a given image as fast as possible. Every correct letter wins a coin, every wrong letter loses a coin. The winner gets double the amount of coins.

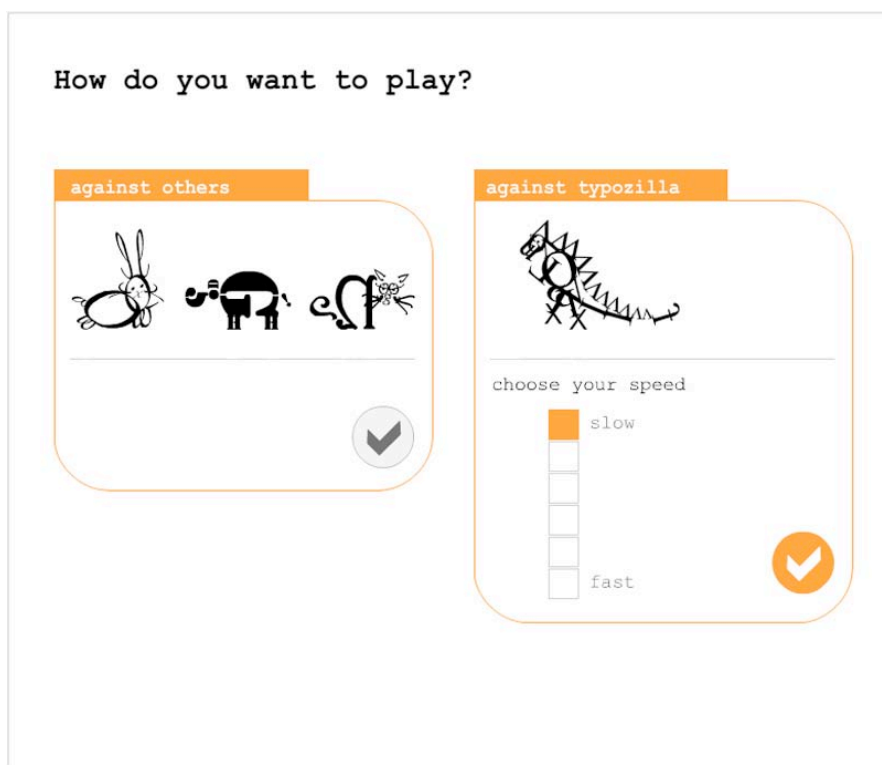


Figure 37. *Typozilla* competition area.

My typozilla is a space that allows children to customise their character and to spend their earned coins upgrading their avatar or buying fonts or colours, which they can then use in their creations.

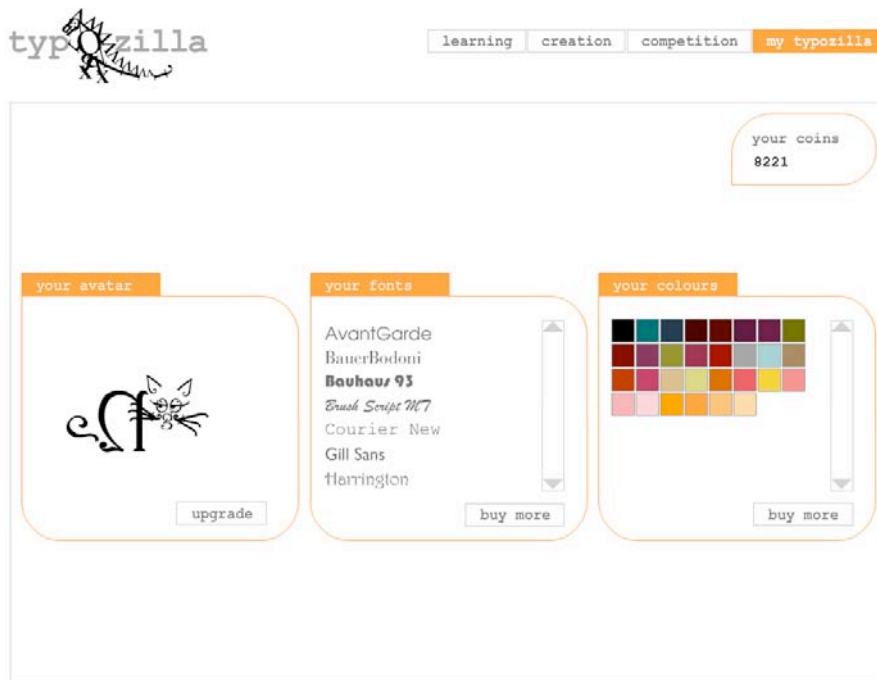


Figure 38. *My typozilla* area.

### 5.3.4 Suitability for intellectual and social needs

#### ***Typozilla stimulates higher order thinking skills***

In addition to basic skills like remembering where to put the fingers on the keyboard and understanding how to use the application, in the creation area of typozilla, children are encouraged to analyse other children’s creations, evaluate them and create their own images with letters. The competition requires children to think creatively and use abstraction to analyse given images. Once the children understand that their image creations get used for the competitions, they are able to create competition levels by themselves.

In response to numbers 1, 2, 5, 8, 12, 19, 22 and 25 of Silverman’s list of characteristics of gifted children (section 2.1.2) the typozilla application was designed to stimulate reasoning through the link between creation and competition and earning coins, observation through the detection of certain letters within pictures, allows perfectionism in learning sections, where children can adjust their speed and play levels over and over until they don’t have any mistake at the highest possible speed, and creative and spatial abilities through rotation, flipping and scaling of letters.

***Typozilla is suitable for a visual-spatial learning style***

Typozilla works with pictures to avoid visual-spatial learners having to type words. Typozilla uses a unique touch-typing method that allows children to create images with typed letters. The images will let them know if they typed the letters properly or not.

Because visual-spatial learners learn most effectively using teaching strategies that employ colour, humour, music, movement, exaggerated size, visualisation and hands-on activities (Silverman, 2009), typozilla uses different font faces, sizes, colours and moving letters and offers room for the children to be creative. In typozilla, children learn to better recognise different fonts not only when they are static, but also when they are rotated, mirrored, scaled and moved. A main advantage of this approach is that the typozilla way engages children's minds more by providing complex visual and mental stimulation. In typozilla, children's attention is drawn to the letters themselves and to their shape and style. The typography has an intrinsic aesthetic value in itself, comparable to calligraphy. Therefore it seems to be natural to work with this inbuilt feature.

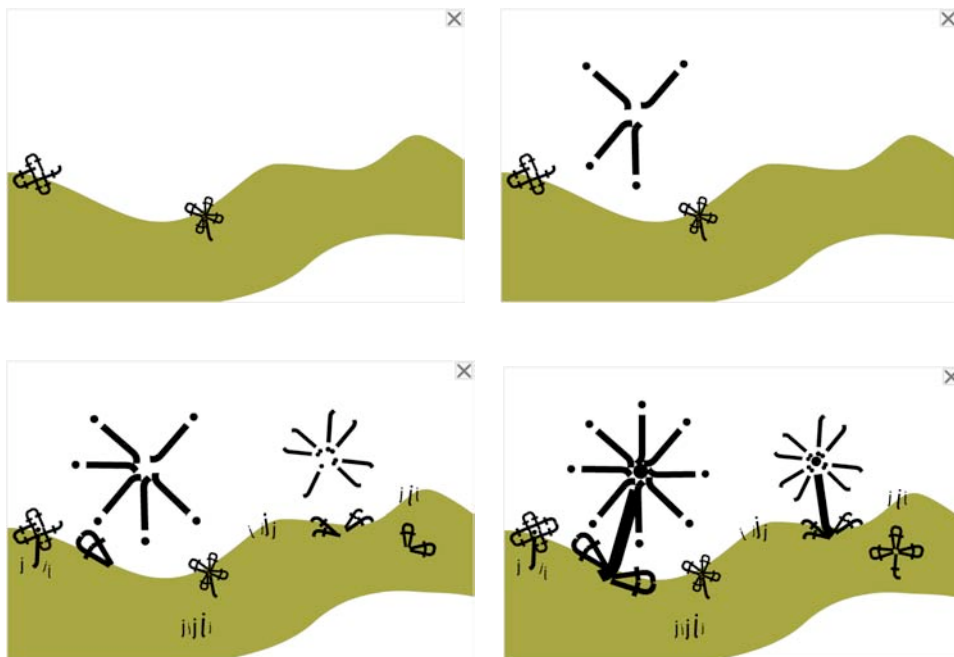


Figure 39-42. *Moving letters in typozilla learning units.*

### ***Typozilla fosters contact with other gifted children***

Children can see each other's avatars and can chat with other players in the main learning area. In addition, they can share images and rate each other's images.

### ***Typozilla is gender balanced***

Sax (2005) found large differences in game choice between the sexes due to different organisation of the visual system. This causes girls to prefer richly textured dolls and baby carriages and colours like red, orange, green and beige while boys prefer trucks, trains, balls and cars and the colours black, grey, silver and blue. He also points out, that girls and boys play and draw differently. While boys draw actions by using only a few colours, girls typically draw static pictures of flowers or people. In typozilla, there is imagery, which appeals to both genders and in addition a balanced amount of different boy and girl themes. The main area in typozilla and the general design is deliberately designed gender neutral.

## **5.3.5 Usefulness for advanced interests**

### ***Typozilla is educational***

In typozilla, children learn the skill of touch-typing. In addition they can learn about typography and selected fonts.

### ***Typozilla is challenging and competitive***

Within typing exercises, children can challenge themselves by increasing the speed of how quickly the letters will appear. They will earn more coins when they type quicker. In addition, there is the whole competition area, in which the children can type against the computer or other players.

### ***Typozilla improves hand-eye coordination***

One of the first activities in typozilla is to learn where to put which finger on the keyboard. While practising, children acquire keyboard and fine motor skills necessary for later fluent typing. Even if the Dvorak keyboard provides a more comfortable alternative to standard keyboards, because its keys are arranged in a more ergonomic way, learning units in typozilla are based on a standard QWERTY keyboard, because it is widely used.





Figure 43. Learning instructions in typozilla.

### ***Typozilla is fun***

Through its visual-spatial approach and intuitive navigation, all areas in typozilla are fun to use.

### ***Typozilla provides different levels***

The learning section is structured in a traditional way with different levels, with exercises, which are building up on each other.

### ***Typozilla is age appropriate***

Typozilla is geared towards eight to twelve year old gifted children. It is not recommended that children use typozilla, if they have not yet learned how to orientate letters properly, because rotation and mirroring of letters might add to their confusion. Typozilla only uses age-appropriate material and pictures. Once users sign up for a typozilla account, they have to confirm that they are not going to distribute any illegal, offensive, rude, obscene or pornographic submission. In order to ensure that users will comply with those rules, a moderator could have to sign off creations and avatars, before they get released to the public. In addition, there could be image-recognition software implemented, which can figure out if any of the submissions are against the rules.

### 5.3.6 Implementation of popular features

#### ***Typozilla has multiplayer functionality***

The prototype application allows up to twenty parallel users. Within the competition up to three users can play against each other at a time.

#### ***Typozilla comes in full screen resolution***

All main features are displayed within one main browser window.

#### ***Typozilla comprises clearly structured layout and intuitive navigation***

The layout is clearly structured and based on a square grid consisting of nine columns. This ensures a similar look and unity across different areas.

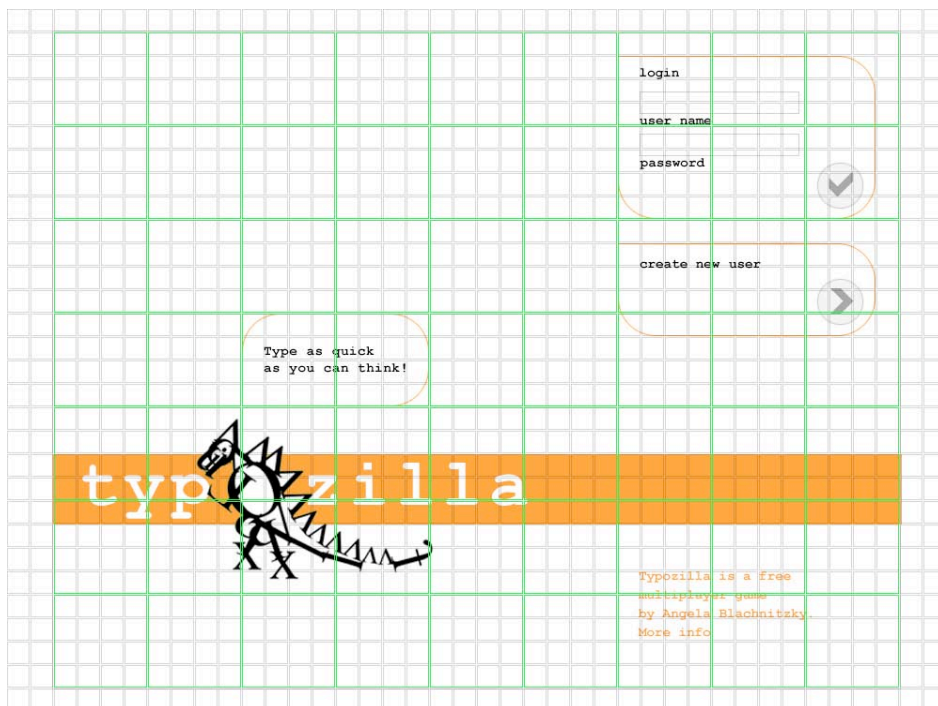


Figure 44. *typozilla* grid.

#### ***Typozilla has little text***

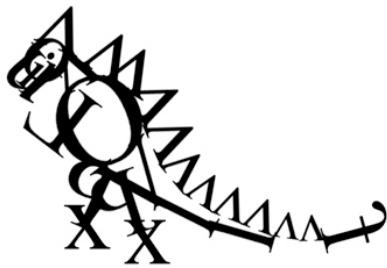
Instructions and text in typozilla is reduced to a minimum amount.

### ***Typozilla allows changeable avatars***

In typozilla, children are able to create their own avatars. Alternatively, if children have earned enough coins, they are able to buy other avatars.

### ***Typozilla has an aesthetic visual appearance***

Colours and fonts are reduced to a minimum amount, with a lot of white background, so that the screen does not appear to be over-loaded. Typozilla uses Courier New as standard font because it looks similar to text written on a typewriter and most text used in the past. Even if children might not have seen a typewriter, they can read the explanations to every font. For instructions and headlines a large font size of 23 point is used while menu items were written in 15 point.



typozilla

Figure 45. *typozilla* logo.

### **5.3.7 Technology appropriateness**

Typozilla shift users from the role of consumers to producers

Children can create their own levels for their competitions against other players.

### ***Typozilla allows customisation***

Depending on which fonts and colours children buy from their coins, they will be able to create different images with those fonts and colours.

your coins  
**8463**


buy fonts

**Schwabacher**

a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	.	,
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	!	?

Schwabacher typefaces were predominant in Germany from about 1480 to 1530. Most importantly, all of the works of Martin Luther, leading to the Protestant Reformation, as well as the Apocalypse of Albrecht Durer (1498) were printed in this typeface. It was probably initially used by Johannes Bamler, a printer from Augsburg, in 1472. The origins of the font name are unclear; some assume that the font was designed by a typeface carver from the village of Schwabach who

cost: **200 coins**




buy

---

**Snell Roundhand**

a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	.	,
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	!	?

cost: **300 coins**



buy




Figure 46. typozilla purchase of fonts.

**Typozilla allows saving and exiting the application at any time**

Many children have only a limited amount of time which they can spend on the computer, therefore it is necessary that they can exit the application at any time and come back to it at a later stage.

## 5.4 Evaluation

### 5.4.1 User observation

The purpose of user testing was to find out if the prototype multiplayer online application typozilla is perceived as well designed and fun to play, if it is easy to use, tolerant to mistakes and helpful for learning touch typing for gifted children.

All children were very excited about seeing each other's characters on the screen and some boys even used the main road for a race amongst their characters.

Some of the boys and all girls at first did not know how to navigate in the learning area and tried to drag characters. Boys tried first to navigate by using the arrow keys and girls tried to drag their avatars. While boys eventually figured out by themselves how to navigate and what can be done in each area, girls sometimes asked for help. Typozilla tried to have a very intuitive navigation with as few explanations as possible. Nielsen (2002) found, that nonidentified boys were significantly more annoyed by verbose pages than were girls (40% of the boys complained, compared to 8% of the girls) and girls complained much more than boys when sites lacked good instructions (76% of the girls compared to 33% of the boys). User testing of typozilla confirmed those findings.

Interestingly, children played the typing sections over and over again, rather than becoming bored and moving on.

Some children immediately wanted to know what they could do with their coins once they earned them. In an updated version a link could directly guide them to my typozilla, where they can check if they have earned enough coins to buy fonts, colours or new avatars.

In the "creation" the icons were easily understood, but some children first tried to get letters down by clicking on them. However, on the second attempt everyone could figure out that they need to be dragged. This also uncovered an inconsistency because the lower navigation bar used the click method and not the drag. In addition, letters should appear bigger once they are dragged into the creation area making them easier to grab.

The learning instruction screen needs to stay longer. Children first looked around on the screen and once they started reading, the screen was gone. Making the instruction go away “on click” rather than after a certain amount of time could solve this problem, but the disadvantage would be that the child would have to lift the fingers and might not remember where they were once the instruction screen is gone.

A major problem was detected when a boy, because he could not read the instruction quickly enough, typed the letters by using incorrect finger positions. Through this mistake, the limitations of the computer became clear. It is only a teacher who can see if the children are using correct fingers.

#### 5.4.2 User generated creations

Pictures, which the children created were impressive for the small amount of time they had (five minutes). This proved that children aged 8-12 are able to create pictures with letters, which can be used for the competition. Two girls did not create images but wrote their names and sentences in different coloured letters. It was not clear, why they created words rather than images and if it was, because they did not like the visual-spatial images approach in general. However, once asked about that, both said, that they prefer the current images approach that typozilla uses and would not want to type words, because *“images have more impact than if typozilla would use words”*.

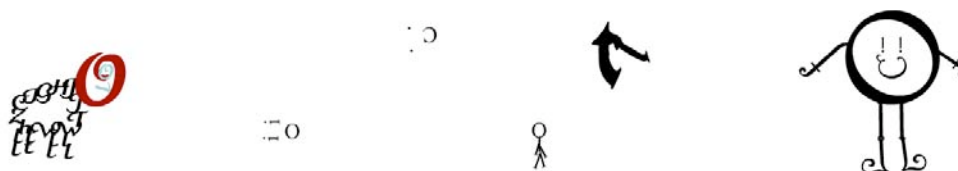


Figure 47. Letter creations by children.

#### 5.4.3 User interviews

Gifted children who were asked about the typozilla game were sophisticated about how they described things they saw and did. Some of them brought a very high level of computer expertise to this usability session.

User interviews found that all children in this study did not yet know how to properly type with ten fingers. Almost all children said that they would like to learn keyboarding by using typozilla. The only child who did not say that he wanted to learn touch typing said that it was not about typozilla but because he wants to make sure that he uses the correct keys by looking at the keyboard while typing.

When asked about how much the children liked typozilla and how many ticks from zero to five the children would give typozilla (five ticks meaning they liked it very much and zero ticks meaning they did not like it at all), five children gave five ticks, four children gave four and three children gave three ticks.

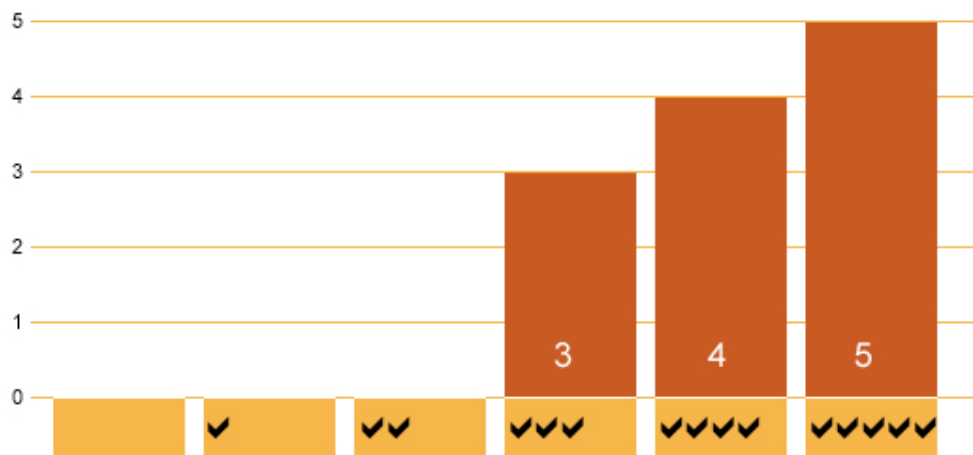


Figure 48. *How much gifted children like typozilla, number of ticks per child.*

In regards to navigation, some children mentioned that they would like to have instructions on how to move their characters around. Despite this, all children said that the application was easy to use, even if observation showed that some children had problems grabbing small creator letters. However, this seemed not to be a major concern to them.

All children found the option to buy new font faces and colours from coins good. Some mentioned that they would like to use more colours in the creation and seemed interested in learning about typography.

In addition to the learning units themed as "Gill Garden" and "Helvetica Harbour" they would like to have places like forest, skate park, playground, waterfall, bike hire, candy land, house, helicopter and archery.

Once asked how to best combine learning, creation and competition, the children answered that they wanted a menu to choose from.

If the children could change anything, they said they would bring in powerups (possibilities to get more power or coins), more levels, character customisation and opportunities for acquiring "stuff".



## **5.5 Improvements**

### **5.5.1 Improvements in typozilla**

The typozilla online application is a not fully functional prototype. Due to time limitations of a Masters, not all learning units could be activated. Because of online-safety reasons the self-made letter creations can not yet be seen, shared, rated or used by other players. In order to avoid rude images, image recognition software could be developed. Thus, rather than using creations from the users, the competition in its current stage uses predefined graphics. However, in the most recent version, it is still possible to see other player's avatars, and to chat with them.

After user-testing and interviews with gifted children, more learning units were embedded. Those units use topics which were desired by the children, such as the airport. In addition, a menu bar was embedded, which allows quick access to all areas. The my typozilla section was implemented completely new, based on suggestions of the children, that they would like to use their earned coins in order to buy more colours and that they would be interested to learn about typographic fonts. In the creation area, the letters are now bigger and easier to grab. Some minor usability problems regarding the functionality of typozilla, like allowing additional navigation possibilities through arrow keys and drag-and-drop, still need to be resolved.

Because all children liked the current aesthetics, there was no change made to the general appearance of the typozilla application. The current stage of the typozilla prototype can be accessed at: <http://www.typozilla.co.nz>.

### **5.5.2 Recommendations**

Studies that researched the use of covers for the effectiveness of touch-typing applications found out, that those who covered the keyboard learned significantly faster (Zeitz, 2006). Therefore typozilla could provide a building instruction for children to design their own keyboard cover, maybe integrating and displaying some of the children's own creations with letters or their avatar.

User observation found that the only major limitation of typozilla was the application does not know if the child used the correct finger technique. Bringing in a teacher or advisor to supervise the child could solve this problem. Alternatively, this problem could

be addressed by using camera control. The camera could first learn to recognise the different fingers on individual keyboard keys and then be used to send a signal to typozilla to point out the correct finger technique.

Clark and Callow (1998) suggest the following questions for evaluating learning: Have I succeeded in teaching it? How do I know I have succeeded? What made the approach work for the gifted students? Until now, those questions could not be answered because user testing only provided a rough estimate about the potential for typozilla to become a successful learning and social networking application. In order to fully answer those questions for typozilla, the application would have to advance from a prototype into a real application. This would allow it to be tested in a longitudinal study or in comparison with an existing application.

The typozilla application was originally designed to suit both genders. However, during the design process several findings about boys having more severe problems than girls with handwriting according to fine motor problems became obvious and therefore more boy themes could be brought into typozilla.



## 6. CONCLUSIONS

*The main aim of this research was to design an online application that appeals to gifted children and recognises the identified intellectual and social needs within the New Zealand context. This has been achieved through the prototype application typozilla, which appeals to gifted children, aged eight to twelve years, in various ways.*

Typozilla appeals to gifted children through its multiplayer functionality. Gifted children are enthusiastic about meeting like-minded peers online. This is due to the fact that a multiplayer application is able to address their social needs in providing an environment where gifted children can exercise their relationship skills. Those skills can be practiced in communicative, competitive and collaborative activities with other gifted children in the learning, creation and competition areas of typozilla.

Within the multiplayer areas in typozilla, the most liked activity is the competition. By competing with others, children enhance their self-directed learning skills. They get extrinsically motivated by other children and want to show them their abilities and make them acknowledge those. This ability to celebrate own accomplishments is especially important for the development of gifted children in New Zealand, where strong egalitarian beliefs hinder appropriate provision taking place.

Another reason, why typozilla appeals to gifted children is that it teaches them a new skill in a way that their preferred learning style is supported. They persevere in typozilla's learning activities in that they are engaging their favoured hemisphere through visual-spatial activities. In addition, gifted children, who are often perfectionists, like to continue learning touch-typing with typozilla because the combination of how they can increase the speed level and the visual indication that shows them if all letters were typed correctly, allows them to bring their typing to perfection.

Typozilla is also appealing in terms of its visual aesthetics and intuitive navigation. It uses gender-neutral colours and has a clearly structured layout. Additional attractivity is gained because it uses less, but comprehensive text and is in general easy to understand.

Finally, gifted children find the features that typozilla offers attractive, because gifted children are very creative and typozilla supports their intellectual needs. The application stimulates higher order thinking tasks, because it encourages children to analyse and evaluate images, and inspires the children to creative actions.



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## APPENDICES

### **Ethics (survey)**

#### **NATIONAL PARENT'S SURVEY: HOW GIFTED PRIMARY SCHOOL CHILDREN IN NEW ZEALAND USE INTERACTIVE MEDIA**

##### **Dear parent,**

As part of my Masters in Design research project through the Institute of Communication Design at Massey University, supervised by Antony Nevin and Karen Curley, I am carrying out an anonymous, nationwide parent survey via a web questionnaire.

I mainly want to find out which interactive media applications gifted children are using and what features make those applications suitable for a gifted child's needs. Based on those findings I am planning to release a set of recommendations.

Your views are extremely important for this study. Please take a few minutes to complete this survey. Filling in the questionnaire will take approximately 10 minutes. If you would like to get a summary of the research findings to find out which media applications other gifted children are using, please provide an email or physical address on the web questionnaire.

The survey can be found at:

<http://www.blachnitzky.co.nz/research>

user name: participant

password: giftednz

Within the questionnaire, you can decline to answer any particular question and withdraw from the study at any time before clicking the submit button. Please submit your answers within the next ten days.

Findings from the questionnaires will get published in academic publications and

conference papers. Within those publications, no participants or institutions will be identified.

Please don't hesitate to contact me, if you have further questions.

Thank you very much for your support.

Kind regards,  
Angela Blachnitzky

*Angela Blachnitzky, Lecturer School of Design, Victoria University of Wellington,  
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*This project has been evaluated by peer review and judged to be low risk.  
Consequently, it has not been reviewed by one of the University's Human Ethics  
Committees. The researcher named above is responsible for the ethical conduct of this  
research.*

*If you have any concerns about the conduct of this research that you wish to raise with  
someone other than the researcher, please contact Professor Sylvia Rumball, Assistant  
to the Vice-Chancellor (Research Ethics), telephone 06 350 5249, email  
humanethics@massey.ac.nz.*



## Parents' survey

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### **NATIONAL PARENTS' SURVEY: HOW GIFTED PRIMARY SCHOOL CHILDREN IN NEW ZEALAND USE INTERACTIVE MEDIA**

If you have more than one gifted primary school child,  
please submit one form for each child.

#### **GENERAL INFORMATION**

---

##### **01 Your child's age:**

- 2 years
  - 3 years
  - 4 years
  - 5 years
  - 6 years
  - 7 years
  - 8 years
  - 9 years
  - 10 years
  - 11 years
  - 12 years
  - 13 years
- 

##### **02 Your child's gender:**

- male    female
- 

##### **03 Your child's favourite activities:**

- reading
  - writing
  - speaking
  - working with numbers
  - science
  - painting, drawing
  - building
  - sports
  - dance
  - making music
  - listening to music
  - working and interacting with others
-

---

**05 What interactive media does your child use at home?**

- computer with internet access
- computer without internet access
- game player like Playstation, Wii, Xbox
- handheld player like Gameboy
- cell phone
- MP3 player like iPod
- other interactive media. Please specify

---

**06 On average, how many hours per day does your child currently spend in front of computers, video games and websites?**

- hours  weekdays
- hours  weekends & holidays

---

**07 How often does your child play with other children after school?**

- never
- fortnightly
- once a week
- 2-3 times a week
- daily

---

**08 During play with other children after school, how often are computers, video games and websites used?**

- never
- seldom
- often
- always

---

**09 What rules do you have in place for your child to use computers, video games and websites?**

- no rules
- rules about which games or websites they can use
- rules about how long your child can use computers and video games
- rules about the age appropriateness
- other rules. Please specify

---

**YOUR PERCEPTION**

- other rules. Please specify

**10 Please describe how video games and websites have or have not been beneficial for the development of your child's natural abilities into higher level performance:**

**11 What needs should video games and websites address, in order to be helpful for your child's development?**

- mainly educational needs
- mainly social needs
- both, educational and social needs
- other needs. Please specify

**12 What features should an ideal video game or website have, in order to be beneficial for your child?**

**13 Please give an example of such an ideal video game or website**

#### **CURRENT MEDIA USAGE**

**14 Please list three websites, which your child currently uses for gaming activities most often:**

**15 Please list three websites, which your child currently uses for non-gaming activities most often:**

**16 For which purposes is your child using those non-gaming websites:**

- mainly homework  mainly personal interest  both

**17 Please list three computer programs, which your child currently uses most often (non Internet):**

**18 Please list three physical toys or games, which your child currently likes to play with:**

### PAST MEDIA USAGE

**19 Which online multiplayer games, kids online clubs or virtual worlds has your child ever used?**

**20 How old was your child when they first did the following activities online without someone else's help:**

- years  used websites for children
- years  used google or other web search machines
- years  played an online game with unknown others
- years  sent an email
- years  uploaded/ posted data on the Internet
- years  had own website
- years  chatted with a friend via Instant Messaging

### YOUR INTERACTIVE MEDIA USAGE AT HOME

**21 How often does your child see you using computers, video games and websites?**

- hours  hours weekdays
- hours  hours weekends & holidays

**22 How often do you engage in computer, video game and website activities with your child?**

- never
- monthly
- fortnightly
- weekly
- 3-4 times a week
- daily

**OPTIONAL: RECEIVE RESEARCH FINDINGS FROM THIS STUDY**

---

Please provide your contact (email) address below if you would like to be sent a summary of the research findings.

To ensure your anonymity, contact data will not be linked to your answers.

submit questionnaire

Thank you very much for your time and cooperation.



## Ethics (testing typozilla)

### Testing typozilla: Usability study in order to improve the design of a multiplayer touch typing computer game for gifted children

#### INFORMATION SHEET

##### Dear parent,

I am a lecturer at Victoria University, School of Design, and I am undertaking a Masters at the Institute of Communication design at Massey University, which is supervised by Antony Nevin and Karen Curley. As part of my Masters I am carrying out a usability study at GKP. Your child is invited to participate in this research.

The purpose of the usability study is to find out, if my design of the multiplayer touch typing computer game "typozilla" is:

- perceived as well designed and fun to play
- easy to use
- tolerant to mistakes
- helpful for learning touch typing

The "typozilla" computer game test will be conducted with 6-9 students on Thursday, 11<sup>th</sup> June 2009 at xxxxxx primary school during lunchtime. Testing will take around 20 minutes and consists of 15 minutes play observation and 5 minutes interview with structured initial questions. All play and interview sessions will be conducted under my supervision with three children at a time, in order to make them feel more comfortable. At all times also a teacher will be present.

You are under no obligation to accept this invitation to participate in the study. If you give consent and your child decides to participate, they have the right to:

- decline to answer any particular question
- withdraw from the study at any time
- ask any questions about the study at any time during participation
- ask for the recorder to be turned off at any time during the interview

Findings from this study will be used to improve the design of the computer game. Findings will also get published in academic publications and conference papers. Within those publications, no participants or schools will be identified by name or otherwise.

I am planning to audio-record all interview sessions. This audio material will be treated as confidential and only used for documentation purposes. Data will be stored at a secure place at Massey University and destroyed after completion of the project. Giving consent to audio recordings is not mandatory for participating in the research. On the consent form you can state whether you agree or not to your child being audio-recorded. On the consent form you can also state whether you would like to receive a summary of the research findings.

If you have further questions, please don't hesitate to contact me.

Thank you very much for your support.

Kind regards,

Angela Blachnitzky

Angela Blachnitzky, Lecturer School of Design, Victoria University of Wellington,  
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*"This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named above are responsible for the ethical conduct of this research.*

*If you have any concerns about the conduct of this research that you wish to raise with someone other than the researcher(s), please contact Professor Sylvia Rumball, Assistant to the Vice-Chancellor (Research Ethics), telephone 06 350 5249, email [humanethics@massey.ac.nz](mailto:humanethics@massey.ac.nz)".*

## Testing typozilla: Usability study in order to improve the design of a multiplayer touch typing computer game for gifted children

### PARENT CONSENT FORM

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

For the proceeding of the research, you have following options. Please tick the boxes as appropriate:

Yes  No  I agree that my child participates in this study under the conditions set out in the information sheet

Yes  No  I agree to have the interviews of my child being audio taped.

Yes  No  I would like to be sent a summary of the research.

---

Printed Full Name of child

---

Date

---

Signature of Parent(s) or Legal Guardian

---

Printed Relationship to child



## Testing the computer game typozilla

### CHILDREN ASSENT FORM

By signing this sheet, you give assent to this research.

You confirm that:

- You have had the details of the study explained to you.
- Your questions have been answered satisfactory.
- You agree to join this study

Yes  No  I agree that I will get audio taped.

---

Printed Full Name of child

---

Date

---

Signature of child

## Interview questions

# TESTING TYPOZILLA

## INTERVIEW QUESTIONS

---

### About the child:

1. How old are you?
  2. How often do you play computer games?
  3. Do you know how to touch type (type on the keyboard with 10 fingers)?
- 

### About typozilla:

1. How much fun was it to play the typozilla game? Five ticks mean it was a lot of fun, zero points mean it was no fun at all. How many ticks would you give?  
O O O O O
2. Which part of the game did you like most, learning, creation or competition?  
→ Why?
3. Was there anything you didn't like?
4. Was it easy for you to understand how to play the game?  
→ What part was easy?  
→ What part was hard?
5. If you could make any changes in the game, what would you change?  
→ How would you change it?

6. How did you like the design of typozilla, for example that all letters were black and that there is lots of white space and not too many colours?
7. Through competing with others you got points. What would you like to do with those points?
  - Would it be an interesting option, if you could buy different typefaces?
  - Would it be an interesting option, if you would have a highscore list?
8. Would you like to learn touch typing (= typing with 10 fingers) with this game?
9. Would you like to learn more about typography and different letterforms with this game?
10. Would you like to play the game more often?