The Integration of Graphic Communication and Educational Tools for Children with Dyslexia

Amar Abdulla Behbehani
The Integration of Graphic Communication and Educational Tools for Children with Dyslexia

Developing Typographic Solutions to Facilitate the Reading Process of Instructional Text for Children with Dyslexia

Amar Abdulla Behbehani
June 2007

A Thesis submitted to the Faculty of the College of Imaging Arts and Sciences in Candidacy for the degree of Masters of Fine Arts
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The Integration of Graphic Communication and Educational Tools for Children with Dyslexia
I dedicate this research to

my beloved father Professor Abdulla Behbehani,
who made me realize the value of our well being, humanity and education enhancement.

my beloved mother Yosria Soliman,
who devoted her life to raise a loving and successful family.

my beloved siblings Arwa, Mohammed, Essa and Sara,
who are climbing the ladder of success.

my beloved Grandmothers and Grandfathers
who I wished to witness the new successful generation of their offsprings.

my beloved country Kuwait,
that made my success possible.
Thank You...

Father for
being my role model,
supporting me to achieve my dreams,
and inspiring me to become a better person.

Mother for
being there for me,
giving me the heart that kept me warm,
and being who you are.

Sara for
inspiring me,
listening to me
and witnessing the moments of happiness and sadness.

Auntie Mona for
supporting me in my moments of stress,
and accompanying in my first steps of success.

Auntie Eqbal for
motivating me to become a stronger woman
and defining my path as a female educator.

Deborah Beardslee for
being my mentor and friend,
and building the designer within me.

Bruce Ian Meader for
teaching me the value of the visual language
and Brucifying me.

R.Roger Remington for
teaching me the history of what we are,
and inspiring me to become a successful design educator.

Thank you...
to all of you who made this success possible.
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## Thesis Title

**The Integration of Graphic Communication and Educational Tools for Children with Dyslexia**

Developing Typographic Solutions to Facilitate the Reading Process of Instructional Text for Children with Dyslexia

## Thesis Topics

<table>
<thead>
<tr>
<th>Design Topic</th>
<th>Typography</th>
</tr>
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<tbody>
<tr>
<td>Outside Topic</td>
<td>Dyslexia</td>
</tr>
</tbody>
</table>

## Problem Definition

Design for education is an important approach in the graphic design field. The intention of this thesis is to conduct further research that can help educators and designers build healthier learning environments for children with learning disabilities. Learning environments are not limited to physical environments such as classroom designs or school architecture; they are extended to cognitive environments that are greatly affected by external influences such as sensory stimulation and learning methods. Children with special educational needs could benefit from effective design solutions for better information processing. This designer attempts to develop typographic solutions to facilitate the reading process of instructional text for 10-year-old children with dyslexia.

The process of reading is the essence of learning and is the main source of knowledge and education enrichment. Therefore, it is essential to help children become independent readers to make them strong learners and active members of educated societies. Reading specialists and graphic designers can work together to develop the efficiency of reading materials. This designer examines the potential of developing typographic solutions for selected reading materials to improve the learning process of reading for children with Dyslexia. The findings of the thesis will add to the knowledge of graphic designers when designing for complex issues that demand intensive research and direct user observation. It will reflect the influence of graphic design in improving learning environments and cognitive health. And above all, it will further educate instructors to use design solutions when needed.

## Problem Overview

Graphic designers have important socio-cultural responsibilities to uphold. In general, they are concerned about making a difference in society regardless of the profession they serve. They focus on the development of visual communication methods to enhance the visual literacy and the aesthetic ordering of typography, image and form to convey a message. This thesis is a personal contribution to children with learning disabilities because they deserve equal educational opportunities that could add to their qualities of life. It is generally known and accepted that the graphic design of books and instructional text affect children's learning processes in general; therefore great attention should be given to design solutions when designing instructional materials especially for children who have reading disabilities such as Dyslexia.
Without doubt, the design of instructional materials benefits both the educator and student. The benefits sometimes are extended to parents and other parties who are involved in students’ educational process. There are numerous design elements that could be addressed in this context but this thesis is focusing on typographic and layout design factors. It is believed that these factors significantly affect the visible language and information processing and perception. The main audience for this thesis are 10-year-old children with Dyslexia. The findings of this thesis are examined in the Norman Howard School for Children with Learning Disabilities, Rochester, New York. The reason for this choice is to eliminate socio-cultural factors such as stereotype and discrimination against children with learning disabilities in this study. Other audiences and users are educators, parents, children facing reading problems in general, educational publishers and graphic designers who design for educational purposes.

Parallel to the design profession, this thesis is a multi-disciplinary research with reading specialists, educators and graphic designers to study the possibilities of developing typographic solutions to facilitate the reading process of instructional text for 10-year-old children with Dyslexia.

This study intends to add to the body of knowledge about what we currently know of the impact of typographic design on the reading process for children with this learning challenge. To accomplish this, it is essential to follow goal-setting techniques to measure further progress. Defined objectives and strategies provide designers with long-term vision and short-term motivation. When the goals are specific measurable, attainable, realistic and timely, the study and design process yields greater success. The thesis process, goals and timeline are shown in the following explanatory diagrams.
<table>
<thead>
<tr>
<th>als</th>
<th>Objectives</th>
<th>Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>line thesis topic</td>
<td>Research the importance of graphic design in developing reading material in general; then focus on designing for special topics such as Dyslexia.</td>
<td>Search for books and articles about the visual hierarchy of typographic design and its effect on readability.</td>
</tr>
<tr>
<td></td>
<td>Gather information about previous typographic applications for children's reading materials and educational tools.</td>
<td>Meet with Art and Design librarians; research art and design databases for these reading materials.</td>
</tr>
<tr>
<td>Investigate problems of Dyslexia</td>
<td>Research responsibilities of graphic designers and search for designers who made progress in developing educational tools for reading disabilities such as Dyslexia.</td>
<td>Investigate designers who wrote about the responsibilities of design and how it affects society or target audiences. Precedents could be found during this process.</td>
</tr>
<tr>
<td></td>
<td>Define Dyslexia and focus on reading difficulties of children with Dyslexia.</td>
<td>Search for professional definitions in social science and education resources.</td>
</tr>
<tr>
<td></td>
<td>Research the reading difficulties that 10-year-old children of Dyslexia face.</td>
<td>Use the theory or/and method search to define educational theories that could be used. Focus on Howard Gardner's theory of multiple intelligences.</td>
</tr>
<tr>
<td></td>
<td>Examine the visual elements that affect the process of reading when having Dyslexia.</td>
<td>Interview Dr. Suzanne Graney, reading specialist and associate advisor. Consult Norman Howard School for children with disabilities.</td>
</tr>
<tr>
<td></td>
<td>Follow a line of investigation about how reading is monitored in reading classes.</td>
<td>Dr. Suzanne Graney will provide sources about reading monitoring system. Read latest reports of the National Reading Panel (NRP).</td>
</tr>
<tr>
<td></td>
<td>Explore the educational approaches that are used to teach reading in classrooms.</td>
<td>Investigate the Wilson Reading System that Norman Howard School (NHS) uses. Consult the Council for Learning Disabilities and International Dyslexia Association.</td>
</tr>
<tr>
<td>Objectives</td>
<td>Tools</td>
<td></td>
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<tr>
<td>Research the elements of typography and refine typographic variables such as: typography, typeface, line length, linespacing, size and hierarchy.</td>
<td>Give a graphic design problem.</td>
<td></td>
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<tr>
<td>Investigate typographic hierarchy solutions for special education reading materials.</td>
<td>Examine design solutions.</td>
<td></td>
</tr>
<tr>
<td>Write a field study in the Norman Howard School (NHS).</td>
<td>Examine design solutions.</td>
<td></td>
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<tr>
<td>Expose students to follow researchers and get effective peer critique.</td>
<td>Review typography books and former typography courses taken at RIT.</td>
<td></td>
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<tr>
<td>Share the possibilities of an application that reflects research, observational and experimental processes.</td>
<td>Investigate the Wilson Reading System.</td>
<td></td>
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<tr>
<td>Design an interview survey for both intermediate and retrospective evaluations.</td>
<td>Design an interview survey for both intermediate and retrospective evaluations.</td>
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</table>

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review typography books and former typography courses taken at RIT.</td>
<td>Develop and analyze research findings.</td>
</tr>
<tr>
<td>Meet with Professor Bruce Statler to learn about hot topics in typography.</td>
<td>Develop and analyze research findings.</td>
</tr>
<tr>
<td>Conduct a field study in the Norman Howard School (NHS).</td>
<td>Share design findings.</td>
</tr>
<tr>
<td>Expose students to follow researchers and get effective peer critique.</td>
<td>Share design findings.</td>
</tr>
<tr>
<td>Share the possibilities of an application that reflects research, observational and experimental processes.</td>
<td>Share design findings.</td>
</tr>
<tr>
<td>Design an interview survey for both intermediate and retrospective evaluations.</td>
<td>Share design findings.</td>
</tr>
<tr>
<td>Thesis Definition</td>
<td>define thesis title</td>
</tr>
<tr>
<td>-------------------</td>
<td>---------------------</td>
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<tr>
<td></td>
<td>assign thesis topics</td>
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<tr>
<td></td>
<td>identify problem definition</td>
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<td></td>
<td>classify problem overview</td>
</tr>
<tr>
<td></td>
<td>analyze design environment</td>
</tr>
<tr>
<td>Thesis Explanatory Diagram</td>
<td>plan thesis document</td>
</tr>
<tr>
<td></td>
<td>set mission, goals and strategies</td>
</tr>
<tr>
<td></td>
<td>characterize precedents</td>
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<tr>
<td></td>
<td>plan time table</td>
</tr>
<tr>
<td></td>
<td>brainstorm resources</td>
</tr>
<tr>
<td>Research Approaches</td>
<td>collect data</td>
</tr>
<tr>
<td></td>
<td>define typography, dyslexia, reading</td>
</tr>
<tr>
<td></td>
<td>conduct field study in school</td>
</tr>
<tr>
<td></td>
<td>explore possible theories</td>
</tr>
<tr>
<td></td>
<td>contact specialists</td>
</tr>
<tr>
<td>Synthesis &amp; Field Study</td>
<td>connect research findings</td>
</tr>
<tr>
<td></td>
<td>examine observations</td>
</tr>
<tr>
<td></td>
<td>connect theories</td>
</tr>
<tr>
<td></td>
<td>explore possible design solutions</td>
</tr>
<tr>
<td></td>
<td>present thesis approach to students</td>
</tr>
<tr>
<td>Gallery Exhibition</td>
<td>design panels</td>
</tr>
<tr>
<td></td>
<td>share thesis process with the public</td>
</tr>
<tr>
<td></td>
<td>get audience feedback</td>
</tr>
<tr>
<td></td>
<td>expose research findings</td>
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<tr>
<td></td>
<td>intermediate evaluation</td>
</tr>
<tr>
<td>Application Ideation</td>
<td>brainstorm ideas with peers</td>
</tr>
<tr>
<td></td>
<td>explore possible applications</td>
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<td></td>
<td>examine efficiency of application</td>
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<td>sketch ideas</td>
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<td>choose an approach</td>
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<tr>
<td>Thesis Implementation</td>
<td>define application approach</td>
</tr>
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<td></td>
<td>summarize research findings</td>
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<td></td>
<td>document application study</td>
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<tr>
<td></td>
<td>evaluate application</td>
</tr>
<tr>
<td></td>
<td>get feedback</td>
</tr>
<tr>
<td>Thesis Dissemination</td>
<td>exploring methods to share findings</td>
</tr>
<tr>
<td></td>
<td>assign future research</td>
</tr>
<tr>
<td></td>
<td>share findings with researchers</td>
</tr>
<tr>
<td></td>
<td>explore ways of expanding the vision</td>
</tr>
<tr>
<td></td>
<td>publish thesis</td>
</tr>
<tr>
<td>Conclusion &amp; Application</td>
<td>conclude findings</td>
</tr>
<tr>
<td></td>
<td>execute application</td>
</tr>
<tr>
<td></td>
<td>review thesis</td>
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<tr>
<td></td>
<td>produce thesis document</td>
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<td></td>
<td>sign off</td>
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</table>
### Thesis Time Table 2006

<table>
<thead>
<tr>
<th></th>
<th>Fall (11 weeks)</th>
<th>Winter (11 weeks)</th>
<th>Spring (11 weeks)</th>
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<tbody>
<tr>
<td>1</td>
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<td>9</td>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Thesis Progress
- Thesis Planning Document
- Research and Synthesis
- Documentation & Application

#### Committees
- Individual Meetings: 1, 2, 3, 4, 5, 6

#### Exhibition Deadlines
- Preparation
- Opening
- Deinstallation

#### Observation
- Observational Sessions

#### Application
- Ideation
- Implementation

---

**Figure 3**
Thesis Time Table
Precedents

Bruce Ian Meader

"Typography is the foundation of the broader study of graphic design. Typography is also the visual representation of language. Identifying the syntax of a message and visually reflecting the linguistic relationships within is central to the graphic design designer's role. We must be able to identify and express the relationship between language (the spoken word) and typography (the mass-produced visual word)"

(Professor Meader in the Graduate Typographic Design Lecture, Winter 2004).

Bruce Ian Meader, Associate Professor, Graphic Design, received his undergraduate and graduate education in graphic design at Carnegie Mellon University in Pittsburgh. He has taught at the University of Michigan and now teaches at Rochester Institute of Technology in Rochester, New York. Professor Meader has great contributions to the field of design education, especially typography. His passion for typography has great influence on graphic design students at the undergraduate and graduate level.

The success of this thesis is inspired Bruce's teachings and effective technique in typographic design. He believes that the graphic design discipline has great potential to improve human environments; especially situations that require information processing and cognitive perception. Throughout his lectures, he indicated that typographic design has "power and affects the transmission of a message;" and this thesis is exploring the possibilities of using this power to further expand the typographic effect on different learning environments outside the design discipline such as education.
Typographic and graphic design, which renders visible the relationships between aural and visual components of language in instructional material, can facilitate the learning of emergent reading skills for reading-disabled and typical children. The value of well designed instructional materials is that they simplify the acquisition of reading skills through their motivational power, their operational or functional facility, and their flexibility and adaptability to a wide variety of remedial and prescriptive instructional tasks and objectives. (Colberg, 1)

Professor Susan Colberg is the coordinator of the Visual Communication Design Program in University of Alberta, Canada. Her MFA thesis was entitled: *Graphic Presentation of Language for Dyslexic Children*. She designed a system of ‘graphic and typographic linguistic cues’ to help children who have problems in language identification and information perception to help them learn reading. This thesis is a continuation of Colberg’s process but it is focused on the process of reading and comprehension rather that linguistic identification. Colberg’s studies has greatly influenced the direction of this thesis because they substantiate that typographic approaches positively affect the process of reading.
Steven Heller

Milton Glaser often says, 'Good design is good citizenship.' But does this mean making good design an indispensable obligation to the society and culture in which designers are citizens? Or does it suggest that design has inherent properties that when applied in a responsible manner contribute to a well-being that enhances everyone’s life as a citizen? For the answer we must also ask the question: What is good design? Is it rightness of form or aesthetic perfection? Is it flawless conception or intelligent usability? The converse, bad or poor design is design that doesn’t work. So, is bad design bad citizenship? In fact, bad design is just plain mean while good design presumably serves many citizens. Nonetheless, 'goodness' is subjective and one can be a good (or great) designer without necessarily being a good citizen. But if good design (regardless of style or mannerism) adds value to society, by either pushing the cultural envelope or maintaining the status quo at a high level, then design and citizenship must go hand in hand.”

(qtd in DT&G Online Magazine, para 1)

Steven Heller is author and co-author of many works on the history of illustration, typography and many subjects related to graphic design. He has expanded his writings in many magazines such as Affiche, Baseline, Creation, Design, Design Issues, Eye, Graphis, How, I. D., Oxymoron, Mother Jones, The New York Times Book Review, Print. (Contemporary Authors Online, para 2). Heller is currently the Senior Art Director of the latter and teaches at the School of Visual Arts in New York City.

Steven Heller’s books and articles generally inspired the thesis concept development. He and Véronique Vienne edited and collected a series of essays about the responsibilities of designers towards society in their book Citizen Designer: Perspectives on Design Responsibility. In the above paragraph, Heller asks a number of questions that formulates the designer’s perception of good design. He claims that designers, like citizens, obligations to become effective members of society. It is not necessary to be a design activist to serve society, it is an obligation of ethical technique and social responsibility toward design investigations and solutions. This thesis is a personal contribution to society, but in a focused manner; it is adding to the value of education and literacy for a special segmented group. Design could serve many social needs and education is one of them.
Krzysztof Lenk

“The most difficult concept for the student to understand and approve the fact that visual communication is foremost visual. This visual language has its own syntax and grammar, and plays with colors, shapes and various contrasts of typography. All these factors influence the meaning of the message, and many of them have no equivalent form in verbal language.”

Krzysztof Lenk is Professor of Graphic Design at the Rhode Island School of Design. He earned his MFA degree at the Academy of Fine Arts, Cracow, Poland. His main teachings are in typographic design and information design. His opinion of typography as a graphic language highly influenced this thesis investigation and confirms the importance of effective typographic design solutions on information systems regardless of theme and media. Typography is not only a visual form of language, it is also a route of communication between the message, and the human cognition and visual perception of the given information. The clarity of the conceptual meaning of information plays a great role in conveying the message; however, the perception of printed or digital information depends very much on the typographic design and the success of the overall visual application. The design hierarchy organizes how the reader should visualize and perceive the information. Therefore, if the reader is young and has a problem like Dyslexia, the visual factor of the message plays a stronger role in the process of education and information perception.
Before starting the research phase, different brainstorming sessions took place to define the structure of the research and synthesis. The brainstorm methods used in the following section were introduced by Professor Deborah Beardslee, Associate Professor in the MFA Graphic Design Program at Rochester Institute of Technology.

In order for this designer to explore the possibilities of reconstructing the design of instructional text for 10-year-old children with Dyslexia, many issues must be identified and defined. The brainstorming process starts with three categories:

- Graphic Design: the general umbrella of the inside topic
- Education: the environment in which the design thesis is implemented
- Learning Disabilities: the broad umbrella of the outside topic

![Three circles diagram with overlapping sections: Graphic Design, Education, Learning Disability]

After categorizing the general scope of the research, it is essential to narrow the brainstorming process. This focused approach allows this designer to pay attention to topics that directly involve the scope of the research. This designer followed a method called mind-mapping to frame research questions that will allow her to form a detail-oriented research approach. Mind-mapping is a visual thinking process that helps the thinker to formulate better research content and strategies. It is also an educational process that facilitates the perceiving, processing, and evaluating of information. Through mind-mapping, prior knowledge about a topic could be defined. Words, numbers, pictures, or any other sign or symbol could be used to represent the ideas and context of study.
This is the mind-map developed to visually express this designer’s stream of thoughts. This thesis is about two main topics: Typography and Dyslexia; however, there are several sub-topics related to this research. These topics fall in the general categories of graphic design, education and disabilities in general (refer to figure 4 in p.17). Mind-mapping helped this designer narrow down the research scope and allowed her to generate the questions that need to be answered throughout this study. This mind-map demonstrates the questions this designer answered in this thesis.

- what kinds of environments does graphic designers serve? and what can it add to them?
- what can typographic design add to the process of learning?
- how can typography improve the process of reading?
- what is the definition of reading, readability and reading disability?
- do Dyslexic children have difficulties in recognizing type?
- what is typography? what is its relation to readability?
- what are the typographic variables that can be used in children's books?
- do children have problems with typefaces?
- what are the benefits of designing instructional text?
- what is the Norman Howard School for children with disabilities?
- what is the mission of the school? and are their goals?
- how do they teach dyslexic children?
- do they have specialized reading sessions?
- what are the complications that dyslexic children face in school?
- what is the Howard Gardner theory for multiple intelligences?
- what kind of intelligences do Dyslexic children have?
- what are the reading theories?
- how does the eye perceive the word?
- how does the cognitive process of reading take place?
- what is Dyslexia? is it a disability? or just a learning challenge?
- why do Dyslexic children have reading problems? vision or perception?
- when was Dyslexia discovered? and who was the first to publish studies about it?
- what are the common factors that dyslexic children have?
- what are the problems of 10-year-old Dyslexic children during reading?
- how do Dyslexic children learn how to read? and taught in specialized schools?
- who teaches dyslexic children how to read?
- who takes the design decisions in the case instructional materials?
- do graphic design rules apply to the instructional process of dyslexic children?
Typography

Definitions of Typography
To determine one definition of typography is impossible because of the subjective opinion of designers and typographers. However, most of the typography specialists agree that typography is a form of ‘visual language’.

Meader’s Definition
According to Bruce Ian Meader, Associate Professor of Graphic Design at Rochester Institute of Technology, typography is ‘the foundation of the broader study of graphic design and it is also the visual representation of language’. He believes that typography and language are interrelated because typography is the ‘mass produced visual word’ that represents the written and spoken one. Without typography, this expression is impossible. (Meader in the Graduate Typographic Design Lecture, Winter 2004)

Colberg’s Definition
Professor Susan Colberg is the Coordinator of the Visual Communication Design Program in University of Alberta, Canada. She defines typography as the ‘graphic presentation of language’. She indicates the importance of typography being the visual display of the spoken language (Colberg, 1)

Lenk’s Definition
Krzysztof Lenk is a Professor of Graphic Design at the Rhode Island School of Design. He simply defines typography as ‘visual language’. He describes it as a special visual language that has its own ‘syntax and grammar’ and route of communication. (qtd in Heller, 206)

Function of Typography
Rolf Rehe is an active media designer who has served clients on an international level. He is the author of Typography and Design for Newspapers and Typography: How to Make it Most Legible. According to Rehe’s homepage, he was trained as a craftsman/typographer in Germany and studied psychology, design and journalism at Indiana University (Rehe, para 1). Rehe said: ‘typography contributes in the ending stage, influences channel transmission, and helps determine perception, selection, and comprehension of the message,’ (Rehe, 15).

He claims that typography, as a design and communication output, is important because it allows the user to perform the activity of reading. And through effective typographic design, it becomes easier for the reader to choose and absorb the printed information. To permit the reader to absorb as much print information as possible, the economy of typographic communication, that is, reading speed, needs to be improved... substantial gains in reading speed can be achieved with typography applying research findings from legibility studies’. (Rehe, 13)

Encoding graphic and typographic design based on legibility research and related physiological factors

Channel
Interferences of the transmission of messages may be caused by poor design or faulty printing

Decoding this process may be improved by design based on human perception, factors of legibility, comprehension... etc

Figure 6
Rehe’s Typographic Communication Diagram
In 2004, The Center for Design Research in Northumbria University, Newcastle, UK, did a study titled: *Relearning Typography: Introducing a Cross-Disciplinary Typographic Framework*. The author indicates the importance of typography and claims that:

"Typography continues to be one of the designer’s main tool of communication, regardless of medium. The introduction of the digital medium has not lessened the importance of this role and has in fact increased the reliance on typography to communicate in a clear and straightforward manner." (Yee 2) "The role of typography will remain unchanged from its communication function. The principal issue to be addressed is the balance between typography with other visual and verbal forms of communication available in the digital medium. Designers will need to consider the balance of these competing forms of communication and understand the value each forms brings to the communication of the message" (Yee, 8).

| Typographic Syntax | According to *Concise Encyclopedia of Syntactic Theories*, the word syntax means ‘arrangement’. And in language, it is the ‘study of the rules that govern the structure of sentences, and which determine their relative grammatically. The term syntax can also be used to refer to these rules themselves, as in the syntax of a language’ (Brown and Miller, para 2). Typographic syntax is clearly defined by Rob Carter, Ben Day, and Philip Meggs in *Typographic Design: Form and Communication*. According to Virginia Commonwealth University’s graphic design homepage, the three authors are widely recognized as national graphic designers and educators in the United States. The authors collaborated to document research, applied applications and student examples to ‘yield both insights and inspiration, bringing order to the complex and diversified subjects of typographic design’. They claim that syntax is ‘the process of arranging elements into a cohesive whole’ (para 46). The graphic designer has the power over the printed word and can communicate with readers through the ‘visual form’ (para 45) of language. This visual form is typography. |

| Readability & Legibility of Type | According to Ellen Lupton, Director of the MFA Graphic Design Program at Maryland Institute College of Art (MICA) in Baltimore, legibility refers to the ease with which a letter or word can be recognized. Readability describes the degree to which a text can be understood. It is determined by measuring comprehension and speed of reading. In design, legibility is ‘clarity and efficiency’; reading provokes pleasure and interest (Ellen, 1).

Rob Carter, Day and Meggs, Professors of Graphic Design and Typography at Virginia Commonwealth University, claim that legibility is ‘achieved by controlling the qualities and attributes inherent in typography that make type readable’ (Carter, Day and Meggs, 87). This means the designer should make typography legible in order to make it readable. |
Rolf Rehe, author of *Typography: How To Make it Most Legible*, summarizes 8 basic methods to measure legibility:

- Speed of Perception
- Perceptibility at a Distance
- Perceptibility at Peripheral Vision and Vocal Variator
- Visibility Method
- Reflex/blink Technique
- Rate-of-work Technique
- Measurement of Eye Movement
- Fatigue in Reading

He says that numerous research findings claim children are able to read standard point sizes (point sizes 9, 10, 11, and 12) faster than larger point sizes. Therefore, ‘printing text books for primary grades in larger-than-normal type sizes may therefore not be necessary’ (Rehe, 49) He also indicates that past research proved that children from 5th grade and above can read standard type sizes used primarily for adult readers.

**Typographic Variables**

Every typographic approach uses numerous graphic design and typographic elements to create a visual gestalt. The range of variables starts from the letterform to the holistic document design. Rob Carter, Ben Day and Philip B. Meggs, authors of *Typographic Design: Form and Communication*, explain these variables in different design contexts. They state that typographic design approaches are complex areas of graphic design and activity. Typographic variables can vary according to the design problem and how much the information needs typographic cues for message delivery. The typographic designer should be an effective reader, information perceiver and good decision maker.

According to Bruce Ian Meader, Professor of Graphic Design and typography at Rochester Institute of Technology, the designer should use the visual logic to determine the typographic variables that should be implemented in a design. He also states that graphic design elements should be considered in typographic approaches along with typographic variables to develop a visual gestalt. In the following are essential typographic variables that should be considered when solving typographic problems in general. This list summarizes typographic factors that were delivered in different graphic design lectures at the Rochester Institute of Technology.
# Typographic Variables

## Typeface

A typeface is a unified system or ‘family’ of letters, numerals, punctuation marks, mathematical symbols, and sometimes decorative symbols. Every family is designed with stylistic and functional unity.

<table>
<thead>
<tr>
<th>Minion Typeface</th>
<th>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</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4 5 6 7 8 9 0</td>
</tr>
<tr>
<td></td>
<td>! &quot; # $ % &amp; ' ( ) * + , - . / : ; &lt; = &gt; ? @ ^ _ `</td>
</tr>
<tr>
<td></td>
<td>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</td>
</tr>
</tbody>
</table>

## Font

Font is a specific version within a typeface. A ‘font family’ is a group of related fonts which vary in weight, orientation, width, size, stretch, etc but not design. For example fonts could be roman italic, bold, light, etc.

<table>
<thead>
<tr>
<th>Univers 45 Light</th>
<th>Univers 45 Light Oblique</th>
</tr>
</thead>
<tbody>
<tr>
<td>Univers 55 Roman</td>
<td>Univers 55 Roman Oblique</td>
</tr>
<tr>
<td>Univers 65 Bold</td>
<td>Univers 65 Bold Oblique</td>
</tr>
<tr>
<td>Univers 75 Black</td>
<td>Univers 75 Black Oblique</td>
</tr>
</tbody>
</table>

## Point Size

Point size is the size of a typeface. It is measured in points:

- One point = 1/72 of an inch
- Hence 72-point type is one inch
- 12 points = 1 pica
- 6 picas = 1 inch (approx)

This document is written in a 10 point size font. The message is highly affected by type size. Headlines are an example of how type size captures reader’s attention.

<table>
<thead>
<tr>
<th>Times</th>
<th>6 pt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Times</td>
<td>8 pt</td>
</tr>
<tr>
<td>Times</td>
<td>10 pt</td>
</tr>
<tr>
<td>Times</td>
<td>14 pt</td>
</tr>
<tr>
<td>Times</td>
<td>16 pt</td>
</tr>
<tr>
<td>Times</td>
<td>24 pt</td>
</tr>
<tr>
<td>Times</td>
<td>30 pt</td>
</tr>
</tbody>
</table>

## Type Weight

Type weight is the thickness of the letter stroke. It provides contrast and clarity to distinguish kinds of information. It greatly affects the visual hierarchy of the information being designed. Heavier stroke weight directly places stronger emphasis on words or lines of type treated.

<table>
<thead>
<tr>
<th>strong contrast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Univers 45 Light</td>
</tr>
<tr>
<td>Univers 75 Black</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>weak contrast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Univers 45 Light</td>
</tr>
<tr>
<td>Univers 55 Roman</td>
</tr>
</tbody>
</table>
Linespacing

Linespacing is the vertical space between lines of type, from baseline to baseline. As a general rule, the space should be 1.5 to 2 times the space between words on a line.

Leading

Typography is the visible language

<table>
<thead>
<tr>
<th>Size</th>
<th>Leading</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 pt</td>
<td>Typography is the visible language</td>
</tr>
<tr>
<td>12 pt</td>
<td>Typography is the visible language</td>
</tr>
</tbody>
</table>

Character Width

Character width is the letter width. Condensing the width of the letter causes the word to have a vertical posture that affects reading. Correct proportions increase the readability of typography and therefore increases the quality of the text.

Birch Std

MESQUITE STD MEDIUM

Arial Narrow

ROSEWOOD STD

bickham Script Pro

Letterspacing & Wordspacing

Letterspacing is the space between letters. Wordspacing is the space between words. Both kinds of spaces should be proportional to the width of the letter. The goal is to achieve optical evenness for good legibility and effective readability.

Typography

Typography

Typography

Typography

Typography

TypographicDesign

Typographic Design

Typographic Design
**Line Length**

Line length is the horizontal length of the line of type or column width. The ideal line length is 10–12 words per line. Overly short or long line lengths negatively affects reading and comprehension. Professor Meader states that “an excessively long line length makes it difficult for the eye to scan a long line of type and successfully return to the left reference margin. Too short a line length is fatiguing to constantly be returning to the left reference margin. The impact of this on readability is significant for longer, continuous, unrelieved amounts of prose text.”

*left reference margin*

Typography is ‘the foundation of the broader study of graphic design and it is also the visual representation of language.’ Typography and language are interrelated because typography is the ‘mass produced visual word’ that represents the written and spoken one.
Sense Breaks

Sense breaks is the process of breaking lines according to reader's perception. According to Professor Meader, lines should end on the right side of the column of the text at logical places that make sense in terms of the syntax of language. Sometimes it is helpful to think of the way text would be phrased if read aloud.

Hyphens at the right edge of the line of type interrupts reading, can cause the reader to momentarily stop to reassemble the word, and does nothing to aid comprehension. Avoid hyphenation if possible.

Upper and Lower Case

Upper and lower case setting aids reading because the outer shape of words is unique. Professor Meader states that this distinction helps the reader more easily recognize the words.

Typography is 'the foundation of the broader study of graphic design and it is also the visual representation of language.'

Typography is 'the foundation of the broader study of graphic design and it is also the visual representation of language.'
Justified and unjustified typography mainly depends on the overall layout design. Unjustified type presents effective legibility to text. In English language, the flush left / ragged right format is the most effective because the eye returns to the same left reference margin after scanning each line of type. Professor Meader states it is also easier to maintain more logical sense breaks, optically even letter and word spacing, and to avoid hyphenation and widows (short, one-or two-word last lines of a paragraph).

Flush Left / Ragged right
Typography is 'the foundation of the broader study of graphic design and it is also the visual representation of language.' Typography and language are interrelated because typography is the 'mass produced visual word' that represents the written and spoken one.

Flush Right / Ragged left
Typography is 'the foundation of the broader study of graphic design and it is also the visual representation of language.' Typography and language are interrelated because typography is the 'mass produced visual word' that represents the written and spoken one.

Centered
Typography is 'the foundation of the broader study of graphic design and it is also the visual representation of language.' Typography and language are interrelated because typography is the 'mass produced visual word' that represents the written and spoken one.

Justified
Typography is 'the foundation of the broader study of graphic design and it is also the visual representation of language.' Typography and language are interrelated because typography is the 'mass produced visual word' that represents the written and spoken one.
**Vertical Alignments**

Vertical alignment points and shifting lines of type horizontally to create new vertical alignment points is one of several ways to distinguish kinds of information. The following examples demonstrate different ways lines of type can be shifted horizontally to yield new vertical alignments.

<table>
<thead>
<tr>
<th>Typography is the foundation of graphic design. It visually represents thoughts, words and language.</th>
<th>Without typography, we wouldn't have the documentation of science, history and literature.</th>
</tr>
</thead>
</table>

Typography is the foundation of graphic design. It visually represents:
- Thoughts
- Words
- Language

Without typography, we wouldn't have the documentation of science, history and literature.
Typographic Hierarchy

Typographic Hierarchy is the order of information according to its contextual ranking. It depends on type decisions that clarifies the ranking of the given information. Hierarchy allows the reader to locate primary information by recognizing typographic clues. According to Professor Meader, establishing a clear effective typographic hierarchy is using typographic variables (linespacing, weight distinction, horizontal shifting...etc) to reveal the hierarchy of information in a text: what is primary, secondary and tertiary information?

Text:
MFA Thesis Exhibition
Bevier Gallery Opening 4/7/2006, 5pm
Reading

There are many professional resources to define reading. The following are several definitions according to reading specialists and typographers.

**Princeton University Dictionary**
Reading is:
- the cognitive process of understanding a written linguistic message.
- a particular interpretation or performance.
- a mental representation of the meaning or significance of something.
- a public instance of reciting or repeating (from memory) something prepared in advance
- interpret something that is written or printed

**University of Essex Education Dictionary**
Reading is “a sense of a word that can be distinguished from other senses or meanings of the same word,” (para, 71).

**Southern Illinois University**
Reading is an “active process (not a product, like history) in which readers shift between sources of information (what they know and what the text says), elaborate meaning and strategies, check their interpretation (revising when appropriate), and use the social context to focus their response,” (Walker, 4).

**Rolf Rehe**
Reading is the process of word perception. “Printed words are momentary images that are perceived by human cognition in a certain period of time,” (Rehe, 17).

Reading Stages

According to Beth M. Arthur, clinical reading specialist and an active participant in *America Reads Challenge*, reading is learned in several of stages (para, 7). The division of these stages make it easier on both the reader and instructor to identify strengths weaknesses of the readers.

**Stage 0**
Is the stage when children learn language and have control over it. In this stage, they pretend how to read rather than actually visualizing and understanding words. This stage begins when the child begins to recognize words and continues to age 6.

**Stage 1**
Is the decoding stage that starts in grade 1 and 2. The recognition of language develops and the child begins to associate sound and symbols. It is the phase of ‘learning how to read’ it is not a smooth for both the child and instructor.
**Stage 2**

This is grade 2 and 3 when the children become fluent readers and are able to decode the process of reading. In this phase, children associate print to speech.

**Stage 3**

In this stage, children are ‘reading to learn’ and absorb ideas. This occurs during grade 4 to 8.

**Stage 4**

In this stage, ‘Readers develop the ability to deal with layers of facts and concepts which are added onto those acquired in earlier stages. This is the high-school phase of education.

**Stage 5**

Readers ‘understand the qualitatively of knowledge’ and are able to fully recognize their needs.

---

**Eye Perception**

Based on Rehe, author of *Typography: How To Make it Most Legible*, printed words are momentary images that are perceived by human cognition in a certain period of time. When reading, the eye scans lines of type in a process called ‘saccadic jumps’. The eye does not move smoothly to perceive words, it jumps from one point to another. The actual perception of the word takes place during the pausing periods between these jumps. The line of type is a series of flashes or exposures during the reading process.

*Hope Clinic*, an association founded by *Developmental Vision Associates* helps individuals who have visual disabilities. They believe that visual skills are critical for the tremendous demands on focus, attention, and thinking that are needed for successful education and careers. Their mission is to ‘meet the complex needs of people who experience problems in learning, concentrating, communicating, working and enjoying life’ (para, 1). They also help students in recognizing their cognitive problems during the process of learning. According to their studies about reading:

“Saccadic eye movements are used to look at multiple objects sequentially. The eyes look at one object and then quickly shift their gaze to another object. When the eyes are fixated or stopped on an object they visually feel the object to understand it. When the eyes are moving from one object to the next the brain must turn off the visual feeling processes, otherwise the whole world would appear to move or jump. When reading text the eyes do not smoothly move across the page but rather make short jumping movements. When the eyes reach the end of the line they again must make a jumping eye movement, but this time in the opposite direction to the beginning of the next line in the paragraph. These jumping eye movements are called saccadic eye movements. If there are problems with these eye movements, it is very easy to lose one’s place.” (para, 3)
When reading text the eyes do not smoothly move across the page but rather make short jumping movements. When the eyes reach the end of the line they again must make a jumping eye movement, but this time in the opposite direction to the beginning of the next line in the paragraph. These jumping eye movements are called saccadic eye movements. If there are problems with these eye movements, it is very easy to lose one's place.
Dyslexia

Definition of Dyslexia

The International Dyslexia Association (IDA) is one of the main organizations dedicated to helping individuals with Dyslexia. It is a non-profit association that serves many communities, and their families. According to their homepage, it is considered one of the oldest organizations of its kind. It was founded in 1949 in memory of Dr. Samuel T. Orton, a distinguished neurologist. Their goal is ‘to provide the most comprehensive forum for parents, educators, and researchers to share their experiences, methods, and knowledge’ (para, 1)

They define Dyslexia as:

“a specific learning disability that is neurological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede the growth of vocabulary and background knowledge.” In one of their explanatory articles they state that dyslexia is a language-based learning disability. Dyslexia refers to a cluster of symptoms, which result in people having difficulties with specific language skills, particularly reading. Students with Dyslexia may experience difficulties in other language skills such as spelling, writing, and speaking. Dyslexia is a life-long status, however, its impact can change at different stages in a person’s life. It is referred to as a learning disability because Dyslexia can make it very difficult for a student to succeed academically in the typical instructional environment.”

Causes

According to several authors and their research, the exact causes of Dyslexia are still not completely clear, but anatomical and brain imagery studies show differences in the way the brain of a person with Dyslexia develops and functions. Moreover, people with Dyslexia have been found to have problems with discriminating sounds within a word, a key factor in their reading difficulties. Dyslexia is not due to either lack of intelligence or a desire to learn. With appropriate teaching strategies individuals with Dyslexia can learn successfully.

Ronald Davis, author and Dyslexia specialist who has Dyslexia, states that it is a self-created condition which means that each person’s situation is unique. Individuals with Dyslexia, share common difficulties in reading, writing, spelling and math. However, some have problems beyond what is mentioned above. Davis looks at Dyslexia as a gift rather than a disability because according to him, it is a perceptual talent that becomes a liability (Davis, 6)

Davis states that Dyslexia is not a result of brain damage or nerve damage. Nor it is caused by the malformation of the brain, inner ear or eyeballs. Dyslexia is a product of thought and a special way of reacting to the feeling of confusion (Davis, 8).
### History

According to the International Dyslexia Association, Dyslexia was exposed in 1896 by an ophthalmologist named W. Morgan when he published an article called: *A Case of Congenital Word-Blindness* in the British Medical Journal. In 1917 another ophthalmologist named J. Hinshelwood wrote a monograph on the same subject *word-blindness* and claimed that it was inherited.

In 1924, Samuel T. Orton, head of the Department of Psychiatry in the Medical School of State University of Iowa, had many cases of individuals who were mentally healthy but couldn’t learn. He was the first to conclude that *word-blindness* does not involve brain damage but involves a ‘maturational deviation of language development’. The term *word-blindness* was transformed to *Developmental Aexia*, and then to *Dyslexia*. After Orton’s death in 1948, many researchers followed in his tracks.

In 1963, Samuel A. Kirk, a Professor of Education and Director of the Institute for Research on Exceptional Children, recognized Dyslexia as an ‘educational handicap’ that was affecting about 20% of the population at that time. The establishment of the Orton Dyslexia Society, which is the International Dyslexia Association now, helped spread the awareness of Dyslexia to the public (Sanders, 42).

Kirk also invented the term *learning disability* in 1963. He is the leading author of the *Illinois Test of Psycho Linguistic Abilities* ‘one of the first psychological tests designed to identify the learning disabled’ (Sanders 36). Before 1963, children with learning disabilities were identified as children who have problems learning and enhancing their academic career. In the 1950s, they were called ‘organic children’. ‘Organic’ means that their problems are a result of brain damage and neurological difficulties.

### Percentage in the US

According to the International Dyslexia Association (IDA), current studies suggest that 15–20% of the population has a reading disability. Of those, 85% have Dyslexia. Dyslexia occurs in people of all backgrounds and intellectual levels. In addition, Dyslexia runs in families; Parents with Dyslexia are likely to have children with the same disability. Some people are identified with Dyslexia early in their lives, but for others their symptoms go unidentified until they get older. People who are very bright can have Dyslexia. They are often gifted in areas that do not require strong language skills, such as art, computer science, design, drama, electronics, math, mechanics, music, physics, sales, and sports.

### Effects of Dyslexia

The latest studies by the IDA suggest that the impact that Dyslexia is different for each person and depends on the severity of the condition and the approaches of the remediation. The most common effects are problems with reading, spelling, and writing. Some Dyslexics do not have much difficulty with early reading and spelling tasks but do experience great problems when more complex language skills are required, such as grammar, understanding textbook material, and writing essays.
People with Dyslexia can also have problems with spoken language. They may find it difficult to express themselves clearly, or to fully comprehend what others mean when they speak. Such language problems are often difficult to recognize, but they can lead to major problems in school, in the workplace, and in relating to other people. The effects of Dyslexia reach well beyond the classroom.

Dyslexia can also affect a person's self-image. Students with Dyslexia often end up feeling less capable than they actually are. After experiencing a great deal of stress due to academic problems, a student may become discouraged about continuing in school.

<table>
<thead>
<tr>
<th>Performance Difficulties</th>
</tr>
</thead>
<tbody>
<tr>
<td>In general, the IDA indicates that children with Dyslexia have difficulties in language such as learning to speak and organizing written and spoken words. Learning letters and their sounds and memorizing number facts and spelling is very challenging for them. As a result, children with Dyslexia have difficulties in reading and learning a foreign language and solving math problems. The following is a summary of difficulties associated with Dyslexia according to IDA, Davis, Stowe and Sanders.</td>
</tr>
</tbody>
</table>

### Difficulty with oral language
- learning to talk
- pronouncing words
- acquiring vocabulary or using age appropriate grammar
- following directions
- having confusions with before/after, right/left, and so on
- learning the alphabet, nursery rhymes, or songs
- understanding concepts and relationships
- difficulty with word retrieval or naming problems

### Difficulty with reading
- learning to read
- identifying or generating rhyming words, or counting syllables in words
- hearing and manipulating sounds in words
- distinguishing different sounds in words
- difficulty in learning the sounds of letters
- remembering names and/or shapes of letters
- reversing letters or the order of letters when reading
- misreading or omitting common small words
- stumbling through longer words
- poor reading comprehension during oral or silent reading
- slow, laborious oral reading

### Difficulty with written language
- putting ideas on paper
- making many spelling mistakes
- proofreading
- making assuagements and homeworks
Difficulty with handwriting
unsure of right or left handed-ness
poor or slow handwriting
messy and unorganized papers
difficulty copying
poor fine motor skills

Difficulty with math
counting accurately
reversing numbers
memorizing math facts
copying math problems and organizing written work
making many calculation errors
retaining math vocabulary and/or concepts

Difficulty with motor skills
planning and coordinating body movements
coordinating facial muscles to produce sounds

Difficulty with organization
losing papers
poor sense of time
forgetting homework
overwhelmed by too much input
working slowly
disorganization

Other Difficulties
naming colors, objects, and letters (Rapid Automatized Naming)
having memory problems
needs to see or hear concepts many times in order to learn them
distracted by visual stimuli
downward trend in achievement test scores or school performance
working in school is inconsistent
relatives may have similar problems
According to specialists, dyslexia becomes a learning disability because of the above stated reasons. Sanders states that general learning disabilities suffer from:

**Underlying Neurological Basis**
This refers to the inadequate functioning of cognitive operations related to learning such as memory, perception, fine motor coordination and attention; (Sanders, 33).

**Uneven Profile of Cognitive Abilities**
This refers to the different and distinct skills that form intelligence (applies to early learners). Includes the modular systems such as perception, attention, and memory (Sanders, 34).

**Interference with Acquisitions of Basic Academic Skills**
This refers to how much the individual can learn and collect data. This difficulty can occur even for people who do not experience learning disabilities (Sanders, 34).

According to Davis, children with Dyslexia share 'mental functions': (Davis, 5)

- Ability to use their mental abilities to 'alter and create perceptions'
- Environmentally sensitive.
- Motivated and more curious than others.
- Visualize images rather than words
- Intuitive and Insightful
- Multi-sensory perception
- Vivid imagination
- Perceive thought as reality

The IDA states that Dyslexia and other related learning disorders cannot be cured. Proper instruction promotes reading success and alleviates many difficulties associated with dyslexia. Instruction for individuals with learning differences should be:

- **Explicit** – directly teaches skills for reading, spelling, and writing
- **Systematic and Cumulative** – has a definite, logical sequence of concept introduction
- **Structured** – has step-by-step procedures for introducing, reviewing, and practicing concepts
- **Multisensory** – engages the visual, auditory, and kinesthetic channels simultaneously
**Multi-sensory Teaching**

All specialists of Dyslexia acknowledge the need of an interactive multi-sensory teaching methods for children with Dyslexia. According the IDA, multi-sensory teaching is simultaneously visual, auditory, and kinesthetic-tactile to enhance memory and learning. Links are consistently made between the visual (what we see), auditory (what we hear), and kinesthetic-tactile (what we feel) pathways in learning to read and spell.

Margaret Byrd Rawson, former President of The Orton Dyslexia Society (now IDA), states that students with Dyslexia ‘need a different approach to learning language from that employed in most classrooms. They need to be taught, slowly and thoroughly, the basic elements of their language, the sounds and the letters which represent them, and how to put these together and take them apart. They have to have lots of practice in having their writing hands, eyes, ears, and voices working together for the conscious organization and retention of their learning; (Article 69, para 3).

The IDA also states:

"Teachers who use this approach teach children to link the sounds of the letters with the written symbol. Children also link the sound and symbol with how it feels to form the letter or letters. As students learn a new letter or pattern (such as s or th), they carefully trace, copy, and write the letters while saying the corresponding sound. The sound may be made by the teacher and the letter names given by the student. Students then read and spell words, phrases, and sentences using these patterns. Teachers and their students rely on all three pathways for learning rather than focusing on a sight-word or memory method, a tracing method, or a phonetic method alone;” (Article 69, par 4)

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**History of Multi-sensory Teaching**

Marcia K. Henry, PhD, has 44 years of experience in the field of reading and Dyslexia. She is a teacher, diagnostician, tutor, professor and was also past president of the IDA and former director of the Center for Educational Research on Dyslexia at San Jose University. She states that multi-sensory teaching methods were introduced by Dr. Samuel Torrey Orton in the 1920s. Orton started applying these methods at the mobile mental health clinic he directed in Iowa. He used the kinesthetic method that was originally described by Grace Fernald and Helen Keller, psychiatrists who investigated sensory stimulation. He believed that 'kinesthetic-tactile reinforcement of visual and auditory associations could correct the tendency of reversing letters and transposing the sequence of letters while reading and writing' (Henry, para 6)

Remediation Plus is an association that targets to remediate the root of academic frustration in children diagnosed with specific language learning disabilities or reading delays. According to them, specialists Anna Gillingham and Bessie Stillman developed a teaching manual in 1936 called the 'alphabetic method' based on Orton's theories. They associated the multi-sensory techniques with teaching the structure of written English, including the sounds phonemes, meaning units (morphemes such as prefixes, suffixes, and roots) and common spelling rules. As a result, the Orton-Gillingham approach was developed, which refers to the structured, sequential, multi-sensory techniques established by Orton, Gillingham and their colleagues (Remediation Plus, para 6)
Researchers conduct theories to explain facts and predict possibilities. In the field of graphic design, a multi-disciplinary research approach is necessary and useful because designers design for contexts or contents outside design. Effective design decisions are developed when they are based on effective research and theories. In this thesis, the design process is related to the processes of communication, learning and reading.
Typographic Theories

The typographic research and theory studies were presented previously in this section in detail. (please refer to p.22)

Communication Theories

**Information Theory**

Bell Lab was founded in 1925 and had great impact on international technological advances. Since then, Bell Labs has made scientific discoveries, developed powerful new technologies, and built the world’s most advanced and reliable networks. The information theory was discovered by Bell Labs’ scientist Claude Shannon in 1948. This theory is about how much information can be sent per unit of time in a system with a given, limited amount of transmission power. According to Encyclopedia Britaneca, ‘some of the concepts have been adopted and used in such fields as psychology and linguistics’. The reason why the Information Theory was integrated in other communication approaches is because Shannon developed an ‘abstract model of communication’ that applies to many situations.

![Diagram of communication process](image-url)

- **message source**: object or person creator of the message
- **encoder**: the object that connects the message
- **channel**: medium
- **noise**: anything that interferes with the message transmission
- **decoder**: the object that converts the message
- **message receiver**: object or person who receives the message
1 Classical Rhetoric

In 2004, the Communication Department at the University of Twente, an entrepreneurial research university in the Netherlands, defined Classical Rhetoric as:

“A combination of argumentation and persuasion. Rhetoric is a blend of classical systems by among others, three ancient Greek teachers: Plato, Isocrates (and the Sophists) and Aristotle. The ancient Greeks wondered about language, because they noticed that spoken or written text had a certain influence” (University of Twente, Communication Department Homepage, para 21)

According to Princeton University Online Dictionary, 2006, Rhetoric is:

- the method on how language perception is processed
- to become proficient in applying the resources of language in their own speaking, writing principles and rules of literary composition
- an excessive ornateness of language

Rhetoric is not only about the art of language and how it is verbally presented. It is also about the message, audience and method of communication (see figure 10).

According to Ron Wright, Communication Professor in The University of Arizona:

“Discerning how language is working in others’ or one’s own writing and speaking, one must (artificially) divide form and content, what is being said and how this is said, because rhetoric examines so attentively the how of language, the methods and means of communication, it has sometimes been discounted as something only concerned with style or appearances, and not with the quality or content of communication.”

\[ \text{communicator} \quad ethos-credibility \]
\[ \quad \text{authority} \]
\[ \quad \text{correctness} \]
\[ \quad \text{appearance} \]
\[ \quad \text{eloquence} \]

\[ \text{audience} \quad \text{beliefs} \]
\[ \quad \text{value} \]
\[ \quad \text{knowledge} \]
\[ \quad \text{experience} \]

\[ \text{message} \quad \text{information} \]
\[ \quad \text{argument} \]
\[ \quad \text{reasons} \]
\[ \quad \text{data} \]
\[ \quad \text{structure} \]

Figure 10
Model of the Rhetoric Theory–Rhetoric Triangle
2 Model of Text Comprehension

Many theories described the process of reading and comprehension. Some concentrate on recognizing letters and words, syntactic parsing of sentences, and understanding the meaning of words and sentences, while others incorporate the meaning of the text in other present knowledge about the same topic.

In 1988, Walter Kintsch and Van Dijk are researchers who concentrated on theories that describe the complete reading process, from recognizing words until constructing a representation of the meaning of the text. In their article The Use of Knowledge in Discourse Processing: A Construction-Integration Model the emphasis of their theory is on understanding the meaning of text. What does text reflect? How do people understand text? Do readers understand reading like they embrace language? As a result, the Model of Text Comprehension was developed. The Communication Department at the University of Twente, Netherlands, summarizes the Model of Text Comprehension and emphasizes its core assumptions and statements as follows:

"When a reader reads a text, an ‘understanding’ of the text is created in the reader’s mind. The process of constructing a situation model is called the ‘comprehension process.’ Kintsch and van Dijk assume that readers of a text build three different mental representations of the text: a verbatim representation of the text, a semantic representation that describes the meaning of the text and a contextual understanding of the reading situation. They also added that text perception can be improved by instruction that helps readers use specific comprehension strategies” (Twente, para 6).

Figure 11
Model of Text Comprehension
3 McLuhan: Medium Theory

Marshall McLuhan is considered one of the pioneers in the communication field. He was a Canadian educator, thinker and communication theorist who earned many honorary awards in the fields of Cultural Studies and Communication (Marshall McLuhan CV, para 1–3) The New Dictionary of Cultural Literacy, 2002, explains McLuhan’s Medium Theory through a famous quote that changed people’s perceptions of the medium:

“`The medium is the message` is a statement by Marshall McLuhan, meaning that the form of a message (print, visual, musical, etc.) determines the ways in which that message will be perceived. McLuhan argued that modern electronic communications (including radio, television, films, and computers) would have far-reaching sociological, aesthetic, and philosophical consequences, to the point of actually altering the ways in which we experience the world” (Hirsch, Kett, and Trefil, para 8).

Jason Wimbley, author of McLuhan's Medium is the Message homepage at the Colorado State University website, states:

“`McLuhan states that people adapt to their environment through a certain balance or ratio of their senses, and the primary medium of the age brings out a particular sense ratio. McLuhan sees every medium as an extension of some human faculty, with the media of communication thus exaggerating this or that particular sense. In his words, ‘The wheel... is an extension of the foot. The book is an extension of the eye... Clothing, an extension of the skin... Electric circuitry, an extension of the central nervous system.’ McLuhan argued that each major period in history takes its character from the medium of communication used most widely at the time. For example, he called the period from 1700 to the mid-1900s the age of print. At that time, printing was the chief means by which people gain and shared knowledge. McLuhan claimed that printing encouraged individualism, nationalism, democracy, the desire for privacy, specialization in work and the separation of work and leisure” (Wimbley, para 3).

This designer intends to redesign for children with special learning needs. She believes that typographic design is a tool and a medium that will deliver the intended learning message. McLuhan said: ‘The medium is the message’ indicating the importance of the medium in delivering the message and how it is an extension of a human faculty.’ Typography, as the visible language, is mainly an extension of human language. Typographic decisions depend on human language and information processing. Every language will have different typographic applications and decisions; and 10-year-old children with Dyslexia have their own visual language to process and understand. Accurate educational and creative decisions affect the information delivery and perception.
Reading is an educational domain that is widely explored by many educators, reading specialists and literacy theorists. It is rather difficult to choose certain theories to study or follow because of the extreme diversity of research approaches. According to the Theory Into Practice (TIP) database, the George Washington University psychology database that summarizes 50 major educational tools: ‘reading is closely related to many other cognitive processes or domains including: attention, concept formation, imagery, language, memory, and perception’ (TIP, para 1).

The following are possible theories and studies that allow this designer to synthesize research findings related to the process of reading.

1 Information Pickup Theory
James J. Gibson, PhD in psychology, is known for his expanded research in theories of perception. He was considered a leading researcher in the topic of perception and considered it to be “direct, without any inferential steps, intervening variables, or associations” (The Dictionary of Philosophy of Mind, para 2).

Information Pickup theory states that perception “depends entirely upon information in the ‘stimulus array’ rather than sensations that are influenced by cognition” (TIP, para 1). The term Pickup refers to percieving, collecting and embracing information. Gibson indicates that:

“The Information Pickup theory stresses that perception requires an active organism. The act of perception depends upon an interaction between the organism and the environment. All perceptions are made in reference to body position and functions (proprioception). Awareness of the environment derives from how it reacts to our movements. The theory opposes most traditional theories of cognition that assume past experience plays a dominant role in perceiving. It is based upon Gestalt theories that emphasize the significance of stimulus organization and relationships. Gestalt theory applies to all aspects of human learning, although it applies most directly to perception and problem-solving. Information pickup theory is intended as a general theory of perception, although it has been developed most completely for the visual system” (TIP, par 3-4).

Goals of Information Pickup Theory
• Facilitate perception in realistic environmental settings used in instructional materials.
• Create an “unconstrained learning environment” to improve the process of perception.
• Emphasize the stimulus characteristics that provide perceptual cues during instruction.
• Outline a theory of reading based upon principles of perceptual development that include:
  1 distinctive features
  2 higher order structures
  3 ignoring irrelevant information
  4 invariant relations in events
  5 abstraction
  6 peripheral mechanisms
2 The Theory and Practice of Early Reading

The Phyllis Weaver and Lauren Resnick, reading specialists and authors of The Theory and Practice of Early Reading, 1979, conducted a study that examined issues that influence the learning process of reading. These issues are:

- Significance of decoding
- The nature of reading skills
- The relationship between reading and language
- Factors that interfere with learning to read
- The acquisition of reading competence

Weaver and Resnick stated that reading became an essential research topic because of the extreme social and scientific development that took place in the 20th century. The study concentrates on both the comprehension and perception of reading processes by exposing the reader to multiple professional opinions about reading. "The general model that emerges from many different analyses is that early stages of reading depend upon letter-sound correspondence with increasing importance upon semantic-linguistic aspects over time" (Weaver and Resnick, para 5)

3 The Cognitive Stages Theory: Genetic Epistemology

In 1968, Jean Piaget, a Swiss psychologist known for his research in developmental psychology, developed the Genetic Epistemology Theory. According to Piaget, the cognitive structure corresponds with the stages of children's development. His research indicates that children experience "four primary cognitive structures":

<table>
<thead>
<tr>
<th>Structures</th>
<th>Age</th>
<th>Cognitive Abilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensorimotor</td>
<td>0–8</td>
<td>Intelligence takes the form of motor actions</td>
</tr>
<tr>
<td>Preoperations</td>
<td>3–7</td>
<td>Intelligence in the preoperation period is intuitive in nature.</td>
</tr>
<tr>
<td>Concrete Operations</td>
<td>8–11</td>
<td>The cognitive structure during the concrete operational stage is logical but depends upon concrete referents.</td>
</tr>
<tr>
<td>Formal Operations</td>
<td>12–15</td>
<td>In the final stage, thinking involves abstractions.</td>
</tr>
</tbody>
</table>

The Theory and Practice of Early Reading

- Facilitated cognitive development by providing activities or situations that engage learners and require adaptation (i.e., assimilation and accommodation).
- Involve the appropriate level of motor or mental operations for a child of a given age; avoid asking students to perform tasks that are beyond their current cognitive capabilities.
- Use teaching methods that actively involve students and present challenges. (TIP), para 6)
3 Social Development Theory
Lev Vygotsky is a Russian psychologist who conducted research in cognitive development particularly in the relationship between language and thinking in 1978. He developed a theoretical framework that emphasizes the fundamental role of social interaction in the development of cognition. He states: “Every function in the child’s cultural development appears twice: first, on the social level, and later, on the individual level; first, between people (interpsychological) and then inside the child (intrapsychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All the higher functions originate as actual relationships between individuals” (qtd in TIPS, para 2).

Vygotsky indicates that the social setting and children's behavior greatly affects their learning processes especially in language. He believes that “in the learning of language, our first utterances with peers or adults are for the purpose of communication but once mastered they become internalized and allow inner speech” (TIPS, para 4).

He also mentioned a very important factor that affects cognition development called Zone of Proximal Development (ZPD), “a level of development attained when children engage in social behavior. Full development of the ZPD depends upon full social interaction. The range of skill that can be developed with adult guidance or peer collaboration exceeds what can be attained alone” (TIPS, para 6).

Since Vygotsky’s theory is a broad theory of cognitive development, it could be compared with other research that also depends on the broader process of cognition. Most of his research targets the context of learning language.
Learning Theories

1 Howard Gardner Theory of Multiple Intelligences
Howard Gardner is the John H. and Elisabeth A. Hobbs Professor of Cognition and Education at the Harvard Graduate School of Education. According to the Encyclopedia of Informal Education, Howard Gardner viewed intelligence as “the capacity to solve problems or to fashion products that are valued in one or more cultural setting” (Gardner, para 17). He lists seven basic intelligences that can be used to enhance the abilities of students in their learning process. His vision was to formulate teaching methods that expand rather than compress students’ intelligence. He summarizes these intelligences as follows:

**Linguistic Intelligence**
“Involve sensitivity to spoken and written language, the ability to learn languages, and the capacity to use language to accomplish certain goals. This intelligence includes the ability to effectively use language to express oneself rhetorically or poetically; and language as a means to remember information. Writers, poets, lawyers and speakers are among those that Howard Gardner sees as having high linguistic intelligence.” (Smith, para 16)

**Logical-mathematical Intelligence**
“Consists of the capacity to analyze problems logically, carry out mathematical operations, and investigate issues scientifically. This intelligence is most often associated with scientific and mathematical thinking.” (Smith, para 17)

**Musical Intelligence**
“Involve skill in the performance, composition, and appreciation of musical patterns.” (Smith, para 18)

**Bodily-kinesthetic Intelligence**
“Entails the potential of using one’s whole body or parts of the body to solve problems. It is the ability to use mental abilities to coordinate bodily movements. Howard Gardner sees mental and physical activity as related.” (Smith, para 19)

**Spatial Intelligence**
“Involve the potential to recognize and use the patterns of wide space and more confined areas.” (Smith, para 20)

**Interpersonal Intelligence**
“Is concerned with the capacity to understand the intentions, motivations and desires of other people. It allows people to work effectively with others. Educators, salespeople, religious and political leaders and counsellors all need a well-developed interpersonal intelligence.” (Smith, para 21)

**Intrapersonal Intelligence**
“Entails the capacity to understand oneself, to appreciate one’s feelings, fears and motivations.” (Smith, para 22)
In *Frames of Mind*, 1993, Howard Gardner mentions that the seven intelligences do not operate separately because the human brain uses them at the same time. He said: “They are used at the same time and tend to complement each other as people develop skills or solve problems” (qtd in Smith, para 23). One of the most important projects that used Gardner’s concept of intelligences is *Project SUMIT 2000* (Schools Using Multiple Intelligences Theory). This project experimented with Gardner’s concept in their educational approach and examined students’ performances in multiple environments. The educators concluded that:

“there have been significant gains in respect of SATs scores, parental participation, and discipline (with the schools themselves attributing this to MI theory). To the extent that Howard Gardner’s Multiple Intelligences theory has helped educators to reflect on their practice, and given them a basis to broaden their focus and to attend to what might assist people to live their lives well, then it has to be judged a useful addition.” (qtd in Smith, para 50)

Mark K. Smith specializes in the field of informal education and lifelong learning. He is the Rank Research Fellow and Tutor at YMCA George Williams College, London. He is also the developer of the Encyclopedia of Informal Education. In 2002, he characterized schools with educational approaches that applied the Multiple Intelligences theory:

**Culture**—Support for diverse learners and hard work. Acting on a value system which maintains that diverse students can learn and succeed, that learning is exciting, and that hard work by teachers is necessary.”(Smith, para 52)

**Readiness**—A wareness-building for implementing MI. Building staff awareness of MI and of the different ways that students learn.”(Smith, para 53)

**Tool**—MI is a means to foster high quality work. Using MI as a tool to promote high quality student work rather than using the theory as an end in and of itself.”(Smith, para 54)

**Collaboration**—Informal and formal exchanges. Sharing ideas and constructive suggestions by the staff in formal and informal exchanges.”(Smith, para 55)

**Choice**—Meaningful curriculum and assessment options. Embedding curriculum and assessment in activities that are valued both by students and the wider culture.” (Smith, para 56)

**Arts**—Employing the arts to develop children’s skills and understanding within and across disciplines.”(Smith, para 57)

This designer is using the MI to determine how 10-year-old children with Dyslexia learn to read. As mentioned earlier in the thesis, children with such learning disability are usually visual learners and are gifted in areas that require visual intelligences. Therefore, these children will learn better if their visual intelligences are properly stimulated. Typographic design is the visual form being used to facilitate their process of reading.
Synthesis

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Developing typographic solutions for educational tools could facilitate the reading process of instructional text for 10-year-old children with Dyslexia.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topic</td>
<td>In the synthesis phase, this designer defines the relationship between research findings and thesis topics: Typography and Dyslexia. This is the process of integrating and threading research findings with these thesis topics.</td>
</tr>
</tbody>
</table>
| Overview   | **Mission**  
Like the nature of the design profession, this thesis is a multi-disciplinary research with reading specialists, educators and graphic designers to study the possibilities of developing typographic solutions to facilitate the reading process of instructional text for 10-year-old children with Dyslexia. |

*The Importance of Design in Human Environments*
In the design profession, designers tend to address environmental problems that individuals face on regular basis. In general, design disciplines added to the development of these environments over the years especially through urban, architectural and interior design but did they all succeed in maintaining or developing individual growth? This thesis further investigates this topic within the learning disabilities context. There are many environments that need graphic design emphasis to increase the quality of human cognition and information processing. There are several possibilities of research topics that could use visual communication approaches to improve the quality of cognitive and physical human environments. Design could be used as a facilitating tool to help humans solve environmental problems and apprehensions that affect their overall growth and development. (see figure 12, page 46)

*The Importance of Graphic Design in Educational Environments*  
Design for education is a topic of concern to many professional designers and educators. The intention of this thesis is to conduct research that can help educators build healthier learning environments for children with learning disabilities such as Dyslexia. The process of reading is the essence of learning and is the main source of knowledge and education enrichment. Therefore, it is essential to help children become independent readers to make them strong learners and active members of educated societies. According to reading specialists and designers who were interviewed in this research, graphic design could improve the efficiency of learning materials and is an essential building block of visual communication. The findings of this thesis will add to the knowledge of graphic designers when designing for complex issues that demand intensive research and direct user observation. Above all, this thesis will reflect the influence of graphic design in improving learning environments and educating instructors to use design solutions when needed. The following figure represents how this designer divides human environments.
Figure 12

Human Environments

Human Closest Environments
- body
- soul
- spirit
- mind

Human Closer Environments
- physical
- technological
- educational
- communicational
- cognitive

Human Near Environments
- interior setting
- urban setting
- cities and towns
- civilizations
- culture

Human Far Environments
- global village
- space
- universe
### Analyzing Thesis Topic

The graphic design approach in this thesis is to investigate possibilities of developing typographic solutions for educational tools to improve the quality of reading and comprehending information. The main goal is to identify the impact of good design on information processing. Without doubt, the design of instructional materials benefits both the educator and student. The benefits sometimes are extended to parents and other parties who are involved in the process of education as well. The following is an analysis of the research investigation and synthesis phases.

### Investigation Phases

<table>
<thead>
<tr>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
<th>Phase 4</th>
<th>Phase 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examine</td>
<td>Examine</td>
<td>Observe</td>
<td>Define</td>
<td></td>
</tr>
<tr>
<td>Typography</td>
<td>Typography</td>
<td>Reading Difficulties</td>
<td>Instructional Tools</td>
<td>Typographic Problem</td>
</tr>
</tbody>
</table>

This thesis is an interrelated study that needs additional multi-disciplinary investigations besides the main thesis topics. The process of learning how to read and the educational theory behind the learning process of 10-year-old children with dyslexia are essential factors to improve their reading and comprehension process. In the following pages, the interrelations will be defined, analyzed and connected to examine whether or not typographic design can improve the quality of instructional text.

In Phase 1, Typography is defined. The typographic variables that can be implemented in the experimental process will be analyzed and explained to the reader through defining these variables and applying visual examples to recognize the typographic effect later on in the application.

Phase 2 is an examination of Dyslexia and its effect on the process of learning specially reading. In this stage, the designer will also introduce the causes of dyslexia and children's lives specially in the educational environment. This designer will also introduce reading as the educational subject that will be examined because this designer is focusing on reading disabilities related to Dyslexia.

Phase 3 will expose the reader to the definition of reading and educational methods that are used in special education programs to facilitate the comprehension process when reading. For an accurate analysis, a close observation was needed to examine how 10-year-old children with dyslexia learn how to read and comprehend information.

In Phase 4, this designer studies the instructional material used in reading sessions and analyzes the importance of having special instructional tools for children with reading disabilities.

Finally, in Phase 5, this designer defines the Typographic Problem. Then she conducts typographic experimentations on chosen instructional text to examine the effects of typographic solutions on educational tools, and whether or not effective design approaches can facilitate the reading process of instructional text for 10-year-old children with Dyslexia.
Typography: A Tool of Visual Communication

What is Typography?
Bruce Ian Meader, Associate Professor of Graphic Design at Rochester Institute of Technology, defines typography as ‘the foundation of the broader study of graphic design and it is also the visual representation of language.’ Professor Meader also states that typography is a ‘mass produced visual word’ that represents written and spoken language; (Meader in the Graduate Typographic Design Lecture, Winter 2004). Susan Colberg, Professor of Graphic Design and Coordinator of the Visual Communication Design Program in University of Alberta, Canada, identifies typography as the ‘graphic presentation of language that renders visible the relationships between aural and visual components of language (Colberg, 1). Krzysztof Lenk, a Professor of Graphic Design at the Rhode Island School of Design, also defines typography as the ‘special visual language’ that has its own ‘syntax, grammar and route of communication,’ (qtd in Heller, 206)

How can typographic design add to the process of learning?
In 1991, Colberg developed a system of ‘linguistic cues’ intending to help children who have problems in language identification and information perception learn how to read. She states that these cues can facilitate children’s perception and learning processes if designed properly. Colberg states that well-designed instructional text simplifies the acquisition of reading skills. Robert Waller is a Professor of Graphic Design in Textual Communication Research Group at the Open University under Michael Macdonald-Ross. He states that typography is not the only medium of language transmission, it is an essential part of language and it is up to the designer to make this ‘visual language’ attractive and functional. He quotes Joseph Maxon and says: “A good compositor is ambitious as well to make the meaning of his author intelligent to the reader, as to make his work show graceful to the eye, and pleasant in reading,” (qtd in Waller, 12).

What are the benefits of designing instructional text?
Typographers and professional designers agree that typography is a form of ‘visual language’ that transfers language, thoughts and ideas to a visual form of communication called typography. In this thesis, this designer is identifying and clarifying the importance of this visual language in the educational environment. If typography is the ‘visual representation of language’ then the process of comprehending this language needs efficient typographic approaches to enhance learning possibilities, especially for those who need special attention such as children with Dyslexia. The learning process depends mainly on reading. Reading depends on clear visual communication and comprehension. This communication is complete when the content and the treatment of the visual message is strong enough to deliver the message.

Rolf Rehe is an active media designer who has served clients internationally and is the author of Typography and Design for Newspapers and Typography: How to Make it Most Legible. He states that ‘typography contributes in the ending stage, influences channel transmission, and helps determine perception, selection, and comprehension of the message,’ (Rehe, 15). Rehe claims that typography, as a design and communication output, is important because it allows the user to perform an activity called reading. And through effective typographic design, it becomes easier for the reader to choose and absorb information. According to Rehe, substantial gains in reading speed can be achieved with typography applying research findings from legibility studies,’ (Rehe, 13). (see Figure 6, p18)
What are the typographic variables that can be used to develop typographic solutions for instructional text for 10-year-old children with Dyslexia?

Effective typographic decisions serve the overall aesthetics of the ‘visual language’ but they also develop the visual function of text. Good Typography, as mentioned earlier, facilitates the process of reading. But is there a set of variables that can achieve this goal? Meader states that Typography is the ‘foundation of the broader study of graphic design and it is also the visual representation of language. How could we have one set of design variables for this language? It is impossible to limit oneself to certain typographic or design decisions, but in complex cases like this, it is possible to choose certain variables to solve the typographic design problem. This designer aims to develop typographic solutions for educational tools that could facilitate the reading process of instructional text for 10-year-old children with Dyslexia. Because this audience suffers from cognitive and learning disabilities, it is important to develop clear, simple and legible typographic solutions for their instructional text. The typographic variables that will be used in redesigning the samples of instructional text are the following: (refer to p. for further information about typographic variables)

Typeface
Font
Point Size
Type Weight
Linespacing
Letterspacing
Wordspacing
Line Length
Sense Breaks
Upper and Lower Case
Unjustified Typography
Vertical Alignments
Typographic Hierarchy

Basic typographic variables were carefully chosen to redesign samples of instructional text for children with Dyslexia. With these variables, this designer will generate simple yet functional solutions to facilitate the process of reading through:

- Analyzing the educational goals of the reading systems
- Identifying the most important content/message.
- Observing original typographic solutions
- Deconstructing the text and generating new typographic decisions
- After that, the text will be broken down and redesigned using the above variables.
Phase 2

Dyslexia: A Learning Disability

What is Dyslexia?
The International Dyslexia Association (IDA), 1996–2007, is one of the main organizations dedicated to helping individuals with Dyslexia. It is a non-profit association that serves many communities, their families. According to their homepage, it is considered one of the oldest organizations of its kind. The IDA was founded in 1949 in memory of Dr. Samuel T. Orton, a distinguished neurologist. Their goal is ‘to provide the most comprehensive forum for parents, educators, and researchers to share their experiences, methods, and knowledge’ (IDA, para 1). IDA defines Dyslexia as:

“A specific learning disability that is neurological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede the growth of vocabulary and background knowledge.”

According to the IDA, 2006, suggest that 15–20% of the United States population have reading disabilities. Of those, 85% suffer from Dyslexia. Dyslexia occurs in people different backgrounds and intellectual levels. In addition, it runs in families; parents with Dyslexia are very likely to have children who suffer from it as well. Some people are identified as being Dyslexic early in their lives, other suffer from it all their lives and never identify it. The IDA indicates that people who have Dyslexia are gifted in many professions such as art, computer science, design, drama, electronics, math, mechanics, music, physics, sales, and sports. They claim these professions do not require strong linguistic intelligences, but how could any profession not require efficient language coding and sensory perception?

According to several of authors, the exact causes of dyslexia are still not completely clear, but anatomical and brain imagery studies show differences in the way the brain of a Dyslexic person develops and functions. Moreover, people with Dyslexia have been found to have problems with discriminating sounds within a word, a key factor in their reading difficulties. Dyslexia is not due to either lack of intelligence or a desire to learn; with appropriate teaching strategies people who suffer from Dyslexia learn successfully.

Ronald Davis, author and Dyslexia specialist who has Dyslexia, states that it is a self-created condition which means that every person’s situation is unique. Davis states that Dyslexia is not a result of brain damage or nerve damage. Nor it is caused by the malformation of the brain, inner ear or eyeballs. Dyslexia is a product of thought and a special way of reacting to the feeling of confusion (Davis, 8).
How does Dyslexia affect the process of learning?

As stated above, the latest studies by the IDA and Dyslexia specialists, suggest that Dyslexia is a self-created condition. The most common learning effects are problems with reading, spelling, and writing. Students who have dyslexia do not have much difficulty with early reading and spelling tasks but do experience problems when more complex language skills are required, such as grammar, understanding textbooks material, and writing essays. People with dyslexia can also have problems with spoken language. They may find it difficult to express themselves clearly, or to fully comprehend what others mean when they speak. Such language problems are often difficult to recognize, but they can lead to major problems in school, in the workplace, and in relating to other people. The effects of Dyslexia reach beyond the classroom; it can also affect a person’s self-image. Students with Dyslexia often end up feeling less capable than they actually are. Students may become discouraged about continuing education. The following is a summary of the effects of Dyslexia on the learning process according to the IDA. (please refer to p 31–32 for more details)

Children with Dyslexia face:

- Difficulty with oral and written language
- Complexity with reading and organization of ideas
- Trouble with comprehension and information processing
- Struggle with math and motor skills
- Problems with memory

What is the major problem of Dyslexia investigated in this thesis?

This thesis is investigating the possibilities of developing typographic solutions for educational tools to improve the quality of instructional text. It aims to improve the design of text to help the reading and comprehension abilities of 10-year-old children with Dyslexia. This designer is trying to examine the complications of reading and comprehension problems children with Dyslexia face throughout the process of reading. Since typography is the ‘visual representation of language’, then it is possible to develop visual communication methods that carry the minimum amount of typographic variables to help these children enhance their reading abilities. As mentioned previously, the IDA indicates that children with Dyslexia face difficulty naming colors, objects, and letters. They face memory problems; therefore, they usually need to see or hear concepts many times in order to learn them. Major concerns were that children with Dyslexia get distracted by overwhelming visual stimuli; does that mean typographic approaches can distract them instead of helping them? Digital typography and advanced multimedia displays allow a wide range of experimentation for typographic solutions. In the case of developing instructional text for children with Dyslexia, the minimum amount of typographic solutions would result in subtle but effective solutions without excessive visual stimuli. In order for this designer to develop these solutions, close observation was needed to examine students reading instructional text, the educational process in reading sessions and the tools used to develop this process.

The IDA also indicates that children with Dyslexia achieve success in creative professions because these fields do not require intensive language usage; is that possible? Could a designer become a successful communicator if he/she has learning deficiencies? How could a student, regardless of their major, learn without adequate abilities to read and comprehend information? Reading is the essence of learning any profession and children with Dyslexia should have equal opportunities to learn and become active members of society regardless of their profession.
Reading: A Process of Practice and Cognitive Perception

What is the definition of reading?
Rolf Rehe, author of *Typography: How To Make it Most Legible*, indicates that reading is the process of word perception. “Printed words are momentary images that are perceived by human cognition in a certain period of time,” (Rehe, 17). Reading is the process of comprehending and recognizing content (message) and visual language represented through letters and symbols (typography). Reading is like any other learning process that needs attention, concentration, practice and application. Rehe also mentioned that printed words are momentary images that are perceived by human cognition in a certain period of time. When reading, the eye scans lines of type in a process called 'saccadic jumps'. The eye does not move smoothly to perceive words, it jumps from one point to another. The actual perception of the word takes place during the pausing periods between these jumps. The line of type is a series of flashes or exposures during the reading process.

Why is it difficult for children with Dyslexia to read?
The IDA, as mentioned previously, states that children with Dyslexia have complex problems in oral and written language, reading, comprehension, motor skills, math and memory. And it is very difficult for them to read and comprehend information because of the following:

**Difficulties in Recognizing Phonological and Phonemic Awareness**
- problems identifying or generating rhyming words, or counting syllables in words
- difficulties hearing and manipulating sounds in words

**Auditory Discrimination**
- problems distinguishing different sounds in words
- difficulty learning the sounds of letters

**Problems with the Learning Process of Reading**
- complications remembering names and/or shapes of letters and order of letters
- misreading or omitting common small words
- stumbling through longer words
- poor reading comprehension during oral or silent reading
- slow and laborious oral reading

**Difficulty with Written Language**
- putting ideas on paper, spelling mistakes and poor proofreading
How could children with Dyslexia learn how to read?
The IDA indicates that children with Dyslexia face difficulty naming colors, objects, and letters. They also face memory problems; therefore, they usually need to see or hear concepts many times in order to learn them. In order for this designer to establish a strong base for this answer, both research and personal observation was needed. Learning methods vary according to personal needs and school curriculums.

Instruction for individuals with learning differences should be:
**Explicit**—directly teaches skills for reading, spelling, and writing
**Systematic and Cumulative**—has a definite, logical sequence of concept introduction
**Structured**—has step-by-step procedures for introducing, reviewing, and practicing concepts
**Multisensory**—engages the visual, auditory, and kinesthetic channels simultaneously or in rapid succession.

As a result, most instructors and special educational systems use these instructions in developing teaching methods to help children with Dyslexia and other learning disabilities how to read. But do they use the same instructions when designing their applications or instructional tools? Could the typographic display of these tools help children with dyslexia become better learners? For this designer to answer these questions, close observation of reading sessions was necessary to examine teaching methods, learning obstacles and the instructional tools used in the process of teaching reading. When researching instructional tools for reading lessons, many results were found. To get reliable results, this designer decided to conduct a field study in one of the accredited schools that have special reading curriculums for 10-year-old children with Dyslexia.

This designer contacted most of the schools in Rochester, New York, where this study was conducted, and located many schools that have 10-year-old children with Dyslexia. But these schools did not have special education programs that would not list these children as a minority of learners. This designer did not want social and psychological factors affecting the process of investigation; therefore, this field study was conducted in Spring 2007 at a private school called the Norman Howard School for Children with Learning Disabilities, Rochester, New York.
Close Observation: Norman Howard Experience

It is essential for this designer to observe, study and evaluate how children with Dyslexia learn. With this close user observation, design solutions will be based on the needs of the children. This field study was conducted in a private school called the Norman Howard School for Children with Learning Disabilities (NHS), Rochester, New York, in Spring 2006.

What is a field study?
The School for Field Studies (SFS), an international non-profit academic institution that provides environmental education and conducts research through its field-based programs in Massachusetts, USA, defines a field study as a study in which the researcher goes to a research site and observes and asks questions, but does not interfere in the environment. The field study is an observational process that provides the researcher with rich and useful resources, (SFS, para 1)

What is the mission of the Norman Howard School for Children with Learning Disabilities?
“The Norman Howard School (NHS) fosters the academic growth of students with learning disabilities while promoting their development as respectful, responsible, resilient citizens. The school advances the understanding of learning disabilities and serves as a resource for the community.” (qtd on the wall of NHS entrance)

Do they have special reading sessions for children with Dyslexia?
According to Rosemary Hodges, Education Director of the NHS, many of the students who attend the Norman Howard School have difficulty with reading and function below grade level. Some students have Dyslexia. The NHS Reading Department is highly skilled in delivering Multi-Sensory reading instruction that engages the visual, auditory, and kinesthetic channels simultaneously or in rapid succession. The reading department’s primary goal is to teach students the decoding, encoding and comprehension skills that enable them to build academic independence. All students in grades 5–12 receive reading 50 minutes a day. Reading classes contain from one to three students and reading comprehension classes have no more than 6 students.

Who teaches them reading?
There are a team of reading and special education specialists that teach children with Dyslexia how to read. This designer had the opportunity to closely work with the co-chair of the reading department Dera Wagner.
What are the purposes behind the reading sessions?
Dera Wagner and her team offer high quality reading instruction especially for children with Dyslexia. An interview was conducted with Dera was conducted to examine the school’s methods of teaching reading. This interview also allowed close observation of reading sessions for children with Dyslexia. Wagner is a special education specialist who teaches reading and teaches students who struggle with comprehension. The aim of the reading department, she added, is to “make these students independent readers as much as possible.” Some students she helps are children with Dyslexia, phonological disorders, lack of perception and slow readers. Wagner was asked about the importance of reading in the learning process and she indicated that reading is the “main pillar for learning and excelling in class performance. Students who have difficulties in reading, will eventually face problems in comprehending and studying other class subjects”.

What is the nature of the reading session environment?
The reading sessions take place in comfortable small classrooms designed especially for individual lessons or small group sessions. Dera Wagner holds sessions in her office that is practically an information capsule for reading and comprehending. Rich sources of reading, instructional materials, games, cards, multi-sensory tools such as visual and audio tools are available. And one of the most important information displays hanging on the wall were, what she called, Thinking Maps. These maps are information diagrams, charts and lists to train students, especially ones who are slow readers, to comprehend information. Every time students raise their eyes to think about answers or wonder how to think of one, multiple solutions are available through information systems that offer fast and convenient strategies for comprehension.

What are the main instructional tools used to teach 10-year-old children with Dyslexia how to read?
The Wilson Reading System (WRS) is the primary program to teach basic reading skills to children with reading disabilities. The Norman Howard School uses this program to facilitate the process of reading for 10-year-old children with Dyslexia. The reading specialists at NHS are formally trained to instruct the WRS. They also use an electronic program called Live Ink that “transforms electronic text into easy-to-read cascading phrases,” as Live Ink specialists indicate, (Live Ink, par 1).

What is the Wilson Reading System (WRS)?
According to the WRS home page, the WRS is a proven multi-sensory and structured language program designed for students who are reading below their expected grade level. The system emphasizes decoding/encoding, has a structured scope and sequence, and systematic materials. It has varying levels of vocabulary to meet individual needs as well as a comprehension component that is typically missing from strictly phonics programs. The WRS is not a one-size-fits-all approach; programs are modified based on student profile performance and need. The system strengthens the reading process for children with dyslexia by repeating the exercises and testing the reading fluency of the children on daily basis.
How does the Wilson Reading System help children with dyslexia?

There are 12 systems in the WRS. These systems aim to teach students reading skills including prediction, clarification, questioning, summarization, and visualization. The emphasis is on helping students use appropriate strategies and skills necessary to become independent readers and learners. Students start lessons by identifying words, sentences and then paragraphs. Gradually, they are able to become better readers.

On April 17, 2006, an e-mail interview was conducted with one of the official WRS trainers and representatives, Margaret Logue. The purpose of the interview was to know more about the print reading system since this thesis is concentrating on developing instructional text for print. Margaret Logue was impressed to know that graphic designers pay attention to such issues and expressed how important this project is for future learners. She stated that the "program is for all ages, 10-year-old children included. The reading system is color-coded so it can help students identify vowels, consonants and welded sounds as distinct from each other. When the program moves toward understanding language structure through the identification of syllables, the color-coding helps students in seeing language patterns rather than learning syllable definitions".

Logue also indicated the program is multi-sensory so it constantly stimulates the visual, tactile and the auditory senses; by this, the reader will be encouraged to combine them as learning methods. As for comprehension, the program teaches students to visualize text, whether it was heard or read, and then to retell the information from the visual representation of information.

Logue added: "The benefits of the Wilson Reading System have been documented through testing the learning outcomes of the students exposed to the program. These results have been positive twenty years since the program was designed. The data analysis of the WRS show reading gains of more than a grade level per year and frequently much larger gains than that for Wislon-taught students. Many children with Dyslexia who do not have the benefit of such systematic instruction, often fall behind even a single grade level per year."

Margaret Logue ended her e-mail by emphasizing the philosophy of the WRS and said: "We believe that the ability to read opens up a world of possibilities to the individual. Reading is a door to personal, spiritual and intellectual growth as well as a necessity for a secure future in today's job market. We also believe that literacy is a cornerstone of freedom and democracy. We at Wilson recognize that teachers are desperate for a solution to the current reading crisis. We understand their frustration. Our goal is to provide teachers with the skills and materials they need to help their students become fluent and independent readers to explore the endless possibilities the world of reading has to offer."

Dera Wagner, Norman Howard School reading instructor, indicated that all reading tutors are obliged to have certified training through the Wilson Reading System Professional Development Program. Logue indicated that teachers could learn to use the program through using the manual, which comes with teaching guidelines. Teachers could also use an online course that parallels the manual but adds more visual materials, or through enrolling in a practice program. This program offers supervision and one-on-one training if needed.
Typographic Experimentation: The Wilson Reading System (WRS)

How could The Visual Communication Arts add to the quality of learning?

Learning styles vary because people have different ways of comprehending information. Many education theorists and specialists developed learning methodologies; however, this designer is concentrating on Howard Gardner’s Theory for Multiple Intelligences (MI). According to the Encyclopedia of Informal Education, Howard Gardner viewed intelligence as “the capacity to solve problems or to fashion products that are valued in one or more cultural settings” (Gardner, para 17). He listed seven basic intelligences that could generally be used to enhance the abilities of students during their learning process; (please refer to p. 46–47 for the complete list). One of these intelligences is the Visual Intelligence. It simply indicates that some students learn more through seeing. These students tend to think and comprehend information through visual aids such as pictures, diagrams, illustrated text books, overhead transparencies, videos, and multiple graphic displays. As mentioned earlier in the research, the IDA indicates that learners with Dyslexia are gifted in many professions such as art, computer science, design, drama, electronics, math, mechanics, music, physics, sales, and sports. Because of this fact, this designer believes that most 10-year-old children with Dyslexia, could be visual learners. But it has come to this designer’s attention that the IDA also claims these visual professions do not require language efficiency. This designer believes that every profession and learning process needs adequate language skills because the first communication tool is language regardless if it was verbal or visual.

Typographic design is a form of visual communication language that requires very careful and creative yet functional decisions. This designer believes that typography is a form of visual form that can very much aid learners with Dyslexia because it adds to the quality of instructional text. Typographic cues provide text with a visual identity, form and function. In this section, this designer demonstrates some of the typographic experimentations that were applied to one of the successful multi-sensory reading systems on national level; this system is called the Wilson Reading System.

The Wilson Reading System (WRS) is a proven multi-sensory and structured language program designed for students who are reading below their expected grade level regardless of their learning disabilities (please refer to p. 58–59 for more information about the WRS). This designer chose this system because of its successful learning outcomes that were carefully measured in the Norman Howard School for Children with Disabilities (NHS), Rochester, New York. It is strongly believed that typographic design decisions can add to the quality of this system and its visual display.
How could typographic design add to the quality of the WRS?
The teaching and overall design of instructional text are two main areas of assessment when evaluating a learning system like the WRS. This system yields effective reading results due to careful learning plans, teacher training, and intense research in cognitive psychology. Nevertheless, the typographic design of the WRS could use more creative attention.

When meeting with reading specialists and special education professionals, it was clearly stated that most of the teachers adjust instructional text to meet children's educational needs. Dera Wagner, special education specialist and reading instructor at the NHS, states that most of instructional texts, specially for children with disabilities, are either "poorly designed or over designed." Through close observation, this designer learned that many electronic reading materials are designed to stimulate children with reading disabilities, such as 10-year-old children with Dyslexia. Sometimes these sources include too many graphic displays and inconsistent typographic design decisions, which negatively affect the process of visual stimulation and comprehension. It is nearly impossible to set a typographic design format for instructional text because these decisions mainly depend on other contextual factors such as the designer's subjective decisions, educational goals, media, budget, deadlines, learners' abilities... etc. However, it is always the designer's responsibility to assess the design problem and carefully consider such contexts to generate successful design solutions. This designer believes that reformatting the typographic cues in the WRS can improve both comprehension and reader's access to selected material. Using simple and functional typographic design solutions can improve performance time and accuracy of the WRS. Original samples of the WRS, assessments of the typographic problems and suggested design solutions are displayed on the following pages.
### Sample of one lesson in the WRS.

<table>
<thead>
<tr>
<th>Word</th>
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<tbody>
<tr>
<td>pay</td>
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<td>complaint</td>
<td>runaway</td>
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<td>haystack</td>
<td>playpen</td>
<td>rainfall</td>
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<tr>
<td>daisy</td>
<td>raison</td>
<td>complain</td>
</tr>
<tr>
<td>repair</td>
<td>payment</td>
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</tr>
</tbody>
</table>
1. Dad will get the bait so we can go fishing in the river.
2. The tot held daisy in his hand for his mom.
3. Tom could not find the raisin bran on the pantry shelf.
4. Sandy hopes to begin painting the den.
5. The subway will be quicker than the bus.
6. The maid was upset as she picked up a trail of papers left in the hall.
7. The kids will organize a relay match at the park.
8. Cara has a birthday in mid-July.
9. Ted will complain about the rain, but I am glad since it will help the garden.
10. Gail must hurry to catch the last train.
Dave came home from the office with a pamphlet in his hand. His wife, Gail, could see the excitement on his face.

"This pamphlet describes the best vacation yet! It describes a hiking team with guides that takes several of days. Bob went last week and gave me the suggestions. He said it was fantastic!" Before he even sat down, Dave had explained it quickly to Gail.

Gail and Dave had gone on many short hikes but never on such a long one. The hike was a challenge. It covered difficult terrain. The trail went past a minor's claim and along cliff ledges.

Gail said, "No way! That sounds like too much hardship for me! That's no vacation. I would probably just complain the whole trip!"
### Typographic Assessments

<table>
<thead>
<tr>
<th>Typographic Variable</th>
<th>Typographic Problems</th>
<th>Typographic Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Typeface and Font</strong></td>
<td>Choice of serif typeface does not suit readers with Dyslexia. Although very commonly used, Times’ serif qualities could sometimes become a barrier to early learners, especially to ones with Dyslexia. The NHS reading specialists stated that ornamental fonts make “it more difficult for children to learn reading and memorize the visual appearances of text, so imagine how difficult it is for children with Dyslexia?” The word ‘ornamental’ means serif fonts like the Times. Children with Dyslexia at the NHS find it difficult to visualize and write some letters like the crazy g and a, as they like to call them. They usually try to write what they see and find it hard imitating the letter. They get confused as to why the letters are shaped with certain finishing strokes but their handwriting doesn’t look the same or carry the same visual qualities. (please refer to figures 13, 14 &amp; 15, p. 62–64)</td>
<td>Changing Typeface and Font. Century Gothic serif sans-serif g g a a</td>
</tr>
</tbody>
</table>

This designer decided to use Century Gothic as an alternative typeface for the WRS typographic experiment because it resembles the handwriting of these children. Century Gothic’s geometric sans serif font increases readability due to its use of perfect circles and straight lines that create clear visible letters. Serif typefaces, like the popular Times, are not necessarily visual barriers of reading and visualizing text. However, with new digital media, typographers and graphic designers developed a wide range of typeface choices that could be used in situations like this.
# Typographic Assessments

<table>
<thead>
<tr>
<th>Typographic Variable</th>
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<th>Typographic Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Point Size</strong></td>
<td>Large point size of 16 pt is used throughout the WRS system. The text readability and comprehension is highly affected by type size. Some times enlarging text is not a solution to increase learner’s abilities to read and comprehend information. Rolf Rehe indicates that legibility in children’s books does not depend on type size. Children are able to read standard point size, such as 9, 10, 11 and 12, faster than larger point sizes. He also indicates that past research proved that children from 5th grade and above can read standard type sizes used primarily for adult readers. As a result, point size 16 is not necessary for better readability. <em>(please refer to figures 13, 14 &amp; 15, p. 62–64)</em></td>
<td>Reduce point size to 12 pt when using Century Gothic typeface and 8 1/2 X 11 page size. Using alternative variables to emphasize clarity of information through typographic hierarchy.</td>
</tr>
<tr>
<td><strong>Linespace</strong></td>
<td>Inconsistent linespace that exceeds 1.5 to 2 times the space between words in a line in word lists. Accurate linespace is very important for readability and overall visual structure. The amount of space depends on typeface, type size, font and line length. <em>(please refer to figures 13, 14 &amp; 15, p. 62–64)</em></td>
<td>Adjust linespace according to standard typographic rules that suit final typographic design decisions that include typeface, type size, font and line length...etc.</td>
</tr>
<tr>
<td>Typographic Assessments</td>
<td>Typographic Variable</td>
<td>Typographic Problems</td>
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</tr>
<tr>
<td>Sense Breaks</td>
<td>Weak sense breaks and multiple use of word hyphenation. Every WRS lesson is divided into 3 sections. The first section is a word list that exposes the reader to a certain syllable. These words are used in sentences and finally in paragraphs. The sense breaks in most of the sentences and paragraphs are not designed according to the reader’s perception. As a result, the perception process is delayed, widows, orphans and hyphenations occur. (please refer to figures 13–15, p. 62–64)</td>
<td>Adjust sense breaks to fit the logical sense of the verbal and visual language. Avoid hyphenation, widows, orphans and incomplete thoughts.</td>
</tr>
<tr>
<td>Line Lengths</td>
<td>Occasionally long sentences in some of the sentences and prose texts According to typographic specialists, a maximally readable line length is 10 to 12 words per line. The WRS applies this rule in some of all the lessons. The target is to train learners to read longer sentences. But children with Dyslexia need more consistent line lengths or shorter sentences for further readability and information comprehension. (please refer to figures 13, 14 &amp; 15, p. 62–64)</td>
<td>Adjust line lengths to increase readability and comprehension. Line length should be 6 to 12 words per line to allow children with Dyslexia rest their eyes during reading more often.</td>
</tr>
<tr>
<td>Typographic Assessments</td>
<td>Typographic Variable</td>
<td>Typographic Problems</td>
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<tr>
<td><strong>Vertical Alignment</strong></td>
<td></td>
<td>Inconsistent shifting in prose text sections which create different and multiple vertical alignments in each page indicating: the title new paragraph page number the word continued</td>
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<tr>
<td></td>
<td></td>
<td>The location of the vertical alignments vary on each page. This inconsistency could confuse readers who are sensitive to the spatial structure of the text. (please refer to figures 13–15, p. 62–64)</td>
</tr>
<tr>
<td><strong>Typographic Hierarchy and Page Layout</strong></td>
<td></td>
<td>Poor typographic and information hierarchy.</td>
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<td>Redundant typographic decisions through out the whole 12 systems.</td>
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<tr>
<td></td>
<td></td>
<td>Because of these two factors, every lesson in the WRS system looks exactly the same. The learners depend on the process of memorizing the information for better reading results. The variation of the visual display, information and typographic hierarchy will allow readers with Dyslexia to easily locate information and identify the ranking of this information for comprehension purposes.</td>
</tr>
</tbody>
</table>
The following typographic designs are 5 solutions of many possible ones using this designer’s suggested solutions in figure 16. As mentioned earlier, the WRS is not a one-size-fits-all approach and teaching methods are modified according to the student’s needs (please refer to p. 58 for additional information). If so, then the typographic solutions in the WRS should follow the same educational goals. Typographic variations will add to the quality of this system and will allow 10-year-old children with Dyslexia and other slow readers experience subtle but effective visual stimulation when reading.

### 1.a

**Typeface**
Century Gothic sans serif

**Font**
Regular

**Point Size**
12 pt

**Letterspace**
wider letterspace

**Vertical Alignment**
3 shifts

**Linespace**
22 pt

<table>
<thead>
<tr>
<th>pay</th>
<th>gray</th>
<th>nail</th>
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<tr>
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1. Dad will get the bait so we can go fishing in the river.
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## 2.a

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<tbody>
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<td>Typeface</td>
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</tr>
<tr>
<td>Point Size</td>
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</tr>
<tr>
<td>Type Weight</td>
<td>Bold to stimulate learner's cognition</td>
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<table>
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</tbody>
</table>
2.b

Typeface
Century Gothic
sans serif

Font
Regular

Point Size
12 pt

Type Weight
Bold to stimulate learner’s cognition

Vertical Alignment
1 shift

Linespace
18 pt

Sense Breaks
edit sense breaks
eliminate hyphens

Numbers
flush R/ ragged L
bold
type size: 10 pt
aligned w/ cap line

1. Dad will get the bait so we can go fishing in the river.
2. The tot held daisy in his hand for his mom.
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Gail said, “No way! That sounds like too much hardship for me! That’s no vacation. I would probably just complain the whole trip!
### 3.a

**Typeface**
Century Gothic sans serif

**Font**
Regular

**Point Size**
12 pt

**Type Weight**
Emphasize ai

**Letterspace**
Wider letterspace

**Vertical Alignment**
3 shifts

**Linespace**
22 pt

<table>
<thead>
<tr>
<th>pay</th>
<th>gray</th>
<th>nail</th>
</tr>
</thead>
<tbody>
<tr>
<td>lay</td>
<td>mail</td>
<td>Gail</td>
</tr>
<tr>
<td>mermaid</td>
<td>gain</td>
<td>snail</td>
</tr>
<tr>
<td>Brain</td>
<td>wait</td>
<td>sprain</td>
</tr>
<tr>
<td>braid</td>
<td>chain</td>
<td>stay</td>
</tr>
<tr>
<td>waist</td>
<td>fair</td>
<td>painting</td>
</tr>
<tr>
<td>crayon</td>
<td>complaint</td>
<td>runaway</td>
</tr>
<tr>
<td>haystack</td>
<td>playpen</td>
<td>rainfall</td>
</tr>
<tr>
<td>daisy</td>
<td>raisin</td>
<td>complain</td>
</tr>
<tr>
<td>repair</td>
<td>payment</td>
<td>railing</td>
</tr>
</tbody>
</table>
3.b

Typeface
Century Gothic sans serif

Font
Regular

Point Size
12 pt

Type Weight
Emphasize ai

Vertical Alignment
1 shift

Linespace
18 pt

Sense Breaks
edit sense breaks eliminate hyphens

Numbers
flush R/ ragged L bold
type size: 10 pt aligned w/ cap line

1. Dad will get the **bait** so we can go fishing in the river.
2. The tot held **daisy** in his hand for his mom.
3. Tom could not find the **raisin** bran on the pantry shelf.
4. Sandy hopes to begin **painting** the den.
5. The subway will be quicker than the bus.
6. The **maid** was upset as she picked up a **trail** of papers left in the hall.
7. The kids will organize a relay match at the park.
8. Cara has a birthday in mid-July.
9. Ted will **complain** about the **rain**, but I am glad since it will help the garden.
10. Gail must hurry to catch the last train.
Dave came home from the office with a pamphlet in his hand. His wife, Gail, could see the excitement on his face.

“This pamphlet describes the best vacation yet! It describes a hiking team with guides that take several of days. Bob went last week and gave me the suggestions. He said it was fantastic!”

Before he even sat down, Dave had explained it quickly to Gail.

Gail and Dave had gone on many short hikes but never on such a long one. The hike was a challenge. It covered difficult terrain. The trail went past a minor’s claim and along cliff ledges.

Gail said, “No way! That sounds like too much hardship for me! That’s no vacation. I would probably just complain the whole trip!”
### 4.a

**Typeface**
Century Gothic sans serif

**Font**
Regular

**Point Size**
12 pt

**Letterspace**
wider letterspace

**Vertical Alignment**
3 shifts

**Linespace**
22 pt

**Hierarchy**
reorganize by: sorting words according to syllables and typographic tabs

<table>
<thead>
<tr>
<th>nail</th>
<th>mail</th>
<th>Gail</th>
</tr>
</thead>
<tbody>
<tr>
<td>mermaid</td>
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</table>

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<tbody>
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</tr>
<tr>
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<td>payment</td>
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Dad will get the bait so we can go fishing in the river.

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Tom could not find the raisin bran on the pantry shelf.

Sandy hopes to begin painting the den.

The subway will be quicker than the bus.

The maid was upset as she picked up a trail of papers left in the hall.

The kids will organize a relay match at the park.

Cara has a birthday in mid-July.

Ted will complain about the rain, but I am glad since it will help the garden.

Gail must hurry to catch the last train.
Gail's Challenge

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Before he even sat down, Dave had explained it quickly to Gail.

Gail and Dave had gone on many short hikes but never on such a long one. The hike was a challenge. It covered difficult terrain.
5.a

Typeface
Century Gothic
sans serif

Font
Regular

Point Size
12 pt

Type Weight
Emphasize
ai & ay

Letterspace
wider letterspace

Vertical Alignment
3 shifts

Linespace
22 pt

Hierarchy
reorganize by:
sorting words
according to
syllables and
type weight

<table>
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<th>Gail</th>
</tr>
</thead>
<tbody>
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<tr>
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<td>chain</td>
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<tr>
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<td>complaint</td>
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<td>daisy</td>
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</tr>
<tr>
<td>complain</td>
<td>repair</td>
<td>railing</td>
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<td>stay</td>
<td>crayon</td>
<td>runaway</td>
</tr>
<tr>
<td>haystack</td>
<td>playpen</td>
<td>payment</td>
</tr>
</tbody>
</table>
5.b

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Gail and Dave had gone on many short hikes but never on such a long one. The hike was a challenge. It covered difficult terrain.
The redesigned 5 samples of the WRS were revised and tested in the Norman Howard School for Children with Learning Disabilities (NHS). Dera Wagner, reading specialist stated that over 65% of readers with Dyslexia had positive reactions towards the visual display of text. The rest were unfamiliar with the new typographic structure; therefore, did not prefer the new typographic approach. Wagner states that most children become better readers because of extreme repetition and training on new texts. For effective results with 10-year-old children with Dyslexia, additional exposure and repetition of sessions are required. She also added that these samples are clear, easy to read and mostly simple to comprehend. She expected these typographic experimentations would be complicated and full of “ornamental” effects. An by that she means, unnecessary visual stimulation factors such as images, color and computer effects. Wagner believes that if graphic designers pay more attention to instructional texts, teachers and education specialists will spend less time developing graphic displays and will have more time to solve student’s reading problems.

This designer attempts to further examine if this typographic approach could serve the 10-year-old public readers; therefore, she decided to apply thesis findings to public school reading materials. The goal is to examine the possibilities of applying effective typographic solutions for instructional text in general to increase the quality of public reading and provide an equal graphic design opportunity to public audiences.
Ideation

Application Overview

The ideation section in this research describes the generation of conceptual sketches and ideas of the final design application. This thesis aims to develop typographic solutions to facilitate the reading process for 10-year-old children with Dyslexia, and in this section this designer explains how she arrived at her final application phase. In the synthesis phase, multiple typographic experimentations were conducted on the Wilson Reading System (WRS) to examine the effect of typographic design on readability and comprehension. The WRS is used exclusively for children with reading disabilities such as Dyslexia, but what about public readers? Does typographic design add to the quality of instructional text? Could typography facilitate their reading process as well? This designer attempts to further determine if this typographic approach could serve the 10-year-old public readers; therefore, she decided to apply thesis findings to public school reading materials. The goal was to examine the possibilities of applying effective typographic solutions to develop public school’s instructional text and provide an equal graphic design opportunity to general readers as well.

Brainstorming

The first brainstorming session took place with chief advisor Professor Meader and peers in the Graduate Graphic Design Program. Groups were formed to help one another generate effective concepts for possible applications. In this session, Professor Meader emphasized that the most important factor in the ideation process is generating a strong concept of a final design problem rather than concentrating on the media. This designer started with the following brainstorming methods:

**Question Lists**

Throughout the entire thesis process, this designer generated question lists on a note pad. These questions helped this designer forming her ideation process. Examples of questions are:

- What is the message?
- What about public readers?
- Does typographic design add to the quality of instructional text?
- Could typography facilitate the reading process of public readers?
- What are the typographic weaknesses in public instructional texts?
- Why reading materials?
- Should I choose another context?
- What do I want to deliver?
- What is the best application?
- What kind of typographic approach?
- What kind of media?
- Should I develop text for children with dyslexia again?
- Should I choose other audience or another disability?
- Should I design a guide for educators or other designers?
- Should I do a series of posters? Brochures?
- How much time do I have for application?
Connecting the Dots
This is a process of connecting open-ended ideas that this designer generated when starting the ideation process. It helped her organize the priority of thoughts during the brainstorming sessions about the application process.

<table>
<thead>
<tr>
<th>Developing Typographic Solutions to Facilitate the Reading Process of Instructional Text for 10-year-old Public School Readers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What kind of text should I use?</strong></td>
</tr>
<tr>
<td>math?</td>
</tr>
<tr>
<td>science?</td>
</tr>
<tr>
<td>comprehension?</td>
</tr>
<tr>
<td><strong>How do I get access to public school text?</strong></td>
</tr>
<tr>
<td>schools</td>
</tr>
<tr>
<td>districts</td>
</tr>
<tr>
<td>former users</td>
</tr>
<tr>
<td>teachers</td>
</tr>
<tr>
<td>book shop</td>
</tr>
<tr>
<td>online</td>
</tr>
<tr>
<td><strong>Who will evaluate the application?</strong></td>
</tr>
<tr>
<td>reading specialists</td>
</tr>
<tr>
<td>NHS reading department</td>
</tr>
<tr>
<td>WRS specialists</td>
</tr>
<tr>
<td>Dr. Graney</td>
</tr>
<tr>
<td>teachers</td>
</tr>
<tr>
<td><strong>How do I get permission to use the text?</strong></td>
</tr>
<tr>
<td>publisher</td>
</tr>
<tr>
<td>author</td>
</tr>
<tr>
<td>school</td>
</tr>
<tr>
<td><strong>How do I choose the text?</strong></td>
</tr>
<tr>
<td>According to what?</td>
</tr>
<tr>
<td>quality</td>
</tr>
<tr>
<td>popularity</td>
</tr>
<tr>
<td>most used</td>
</tr>
<tr>
<td>reading specialist's advice</td>
</tr>
</tbody>
</table>

Application

What kind of audience will benefit from this text?
- children with dyslexia
- poor readers
- general 10-year-old readers
- students of age 10
- tutors
- reading specialists
- reading teachers
- special education tutors
- designers
- publishers
- layout designers
- reading associations

Who do you think are better audience for this research?
Amar ⇐ children (public)
Bruce ⇐
Eunjim ⇐ designers
Kapil ⇐ children and designers
Schools ⇐ children (public)
Sketches
The visual process of sketching generates preliminary ideas of the visual appearances of the application. This designer recorded impressions and ideas through hand-generated and electronic sketches about ideas, concerns and layout design.
Application Details:

1. Media → print
3. Workbook → reading
4. Rework → one lesson
5. Book → text from successful publisher, reading results, variations
6. Copyrights → contact them and take permission.

One Section

how many pages?
Choosing the Text

During the brainstorming process, this designer decided to develop typographic solutions for a public school instructional text. When the typographic experiments of the Wilson Reading System (WRS) were getting positive reactions from both learners and educators, it was decided to stretch the envelope and apply the typographic findings to public school reading text. Will public readers benefit from better typographic solutions like children with Dyslexia? The following ideation process is a quest to answer this particular question.

How do I access reading samples? Questions like this arose while trying to choose adequate instructional text samples for the experimental typographic approach. In the beginning, several contacts were made to public schools, school teachers and publishers to acquire of one reading sample. This process failed because public school books are limited and it was nearly impossible to get an extra copy without the permission of the New York School District. Dr. Suzanne Graney, thesis committee associate advisor and Professor in the Department of School Psychology, Rochester Institute of Technology, suggested an electronic search for Harcourt School Publications. The goal was to locate a textbook that was well written and designed according to USA School District's standards.

*Take Flight*, a textbook for grade 5 (10-year-old learners), was chosen. According to Dr. Graney, *Take Flight* is one of the most successful reading texts because it is published by Harcourt School Publications. She said *Harcourt* is an international education company that serves learners and teachers of all ages. They are known for their high quality learning materials and professional development programs. *Harcourt School Publications*, founded in 1919, New York, specialize in elementary school print and electronic publishing.

Although *Take Flight* is cited as one of the research sources in this thesis, permission was needed to use its text. Online communications, via e-mail, was conducted to get *Harcourt's* permission to use a sample of their text. Permission was granted by *Harcourt* to use one reading lesson for educational purposes. As a result, this designer chose one reading lesson called *A Fish Tale* written by Sydnie Meitser and illustrated by Cindy Wrobel. This designer will use the same typographic experimentations that were used on the WRS to determine if public readers could benefit from improved typographic solutions as the children with Dyslexia did? (please refer to p. 65–83 for details)

<table>
<thead>
<tr>
<th>Application Details</th>
<th>Application</th>
<th>Developing Typographic Solutions of Instructional Text for 10-year-old Public School Readers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject</td>
<td>Reading</td>
<td></td>
</tr>
<tr>
<td>Media</td>
<td>Print</td>
<td></td>
</tr>
<tr>
<td>Audience</td>
<td>10-year-old Public Readers</td>
<td></td>
</tr>
<tr>
<td>Environment</td>
<td>Public Schools</td>
<td></td>
</tr>
<tr>
<td>Text</td>
<td>One lesson</td>
<td></td>
</tr>
<tr>
<td>Book</td>
<td>Take Flight</td>
<td></td>
</tr>
<tr>
<td>Publisher</td>
<td>Harcourt School Publications, 1999</td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>A Fish Tale</td>
<td></td>
</tr>
</tbody>
</table>
A Fish Tale

Original Layout  This is the original typographic design of *A Fish Tale*, a reading lesson for 10-year-old public school readers. It was originally on a 9'X14' spread but was reduced 50% from its original size to fit this document layout. This lesson is 5 pages long but this designer is using the first page only to conduct the typographic experiments. Assessments of the typographic problems and suggested design solutions are displayed on the following pages. Since the main graphic focus in this research is typography, every page will only exhibit the text and the typographic decisions only. Images are excluded because they are not part of the design problem.

Ingrid G Ingrid was down by the lakefront one day when she saw Sam and Travis emerge from the brush. Sam swung a tackle box and held their two fishing poles. Travis grasped a line with a fish on it.
Ingrid hovered close by: “Will you let me fish with you?” she asked.
Sam didn’t like Ingrid. Her name and the way she spoke were foreign to him. Did she come to Kansas just to bug him?

“No, no and no, in case you still ask,” Sam said with authority.
“I know all things to do,” Ingrid said. “When we fished in Finland, my dad said I had a gift for catching big ones”.
“Our fishing spot is just for us,” Travis said. “We made a vow. No one else must use it.”
“Go hug a slug,” said Sam.
Sketches
Ingrid was down by the lakefront one day when she saw Sam and Travis emerge from the brush. Sam swung a tackle box and held their two fishing poles. Travis grasped a line with a fish on it.

Ingrid hovered close by. "Will you let me fish with you?" she asked.

Sam didn't like Ingrid. Her name and the way she spoke were foreign to him. Did she come to Kansas just to bug him?

"No, no and no, in case you still ask," Sam said with authority.

"I know all things to do," Ingrid said. "When we fished in Finland, my dad said I had a gift for catching big ones".

"Our fishing spot is just for us," Travis said. "We made a vow. No one else must use it."

"Go hug a slug," said Sam.

Five times Ingrid asked to fish with them. Five times she got a no. Then she figured out a plan.

The next day, Ingrid ran with her fishing pole to Al's fish shop. She got a big catfish, slipped off to a big hiding spot, and strung it on her line. She was stationed on the path when Sam and Travis came back from the lake.

"Incredible!" said Travis. Sam stared with suspicion.

"That's some fish!" said a man.

The man snapped a shot of Ingrid and her fish.

"I'd like to investigate where you got that," Sam said.

"From the lake", said Ingrid. "I will take out the bones at home."

Travis said, "You know how to cut up a fish by yourself?"

Ingrid Nodded. "Oh, Yes!"

"That's a good skill," said Travis. "We could go fishing sometime."

Sam poked him. "What about our vow, Travis?"

"Travis shrugged.

Travis and Ingrid went fishing and pulled in some bass. Sam got mad seeing Travis with Ingrid. He tossed rocks into the lake to make a commotion and scare off the fish.
<table>
<thead>
<tr>
<th>Typographic Assessments</th>
<th>Typographic Variable</th>
<th>Typographic Problems</th>
<th>Typographic Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Typeface</strong></td>
<td>The typeface used in this reading lesson is Gill Sans. It is a sans serif typeface designed by Eric Gill in 1927. Gill was a well established sculptor, graphic artist and type designer.</td>
<td>The decision to use Gill Sans is not wrong; however, it has some lower case letters like g and a that could cause some difficulties for young learners.</td>
<td>Change the typeface to Century Gothic</td>
</tr>
<tr>
<td></td>
<td>Gill Sans is not wrong; however, it has some lower case letters like g and a that could cause some difficulties for young learners.</td>
<td>As mentioned previously (please refer to p.65), early learners usually try to write what they see and find it hard imitating letters with these specific forms.</td>
<td>Century Gothic is used as an alternative typeface because it resembles children’s handwriting. Century Gothic’s geometric sans serif font increases readability due to its use of perfect circles and straight lines that create clear visible letters.</td>
</tr>
<tr>
<td></td>
<td>Century Gothic is used as an alternative typeface because it resembles children’s handwriting. Century Gothic’s geometric sans serif font increases readability due to its use of perfect circles and straight lines that create clear visible letters.</td>
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<td></td>
</tr>
<tr>
<td><strong>Vertical Alignment</strong></td>
<td>Inconsistent shifting in prose text sections which results in different and multiple vertical alignments on each page indicating: new paragraph beginning of a line</td>
<td>Organize the vertical alignment points to develop an alternative visual display of the text could be helpful to some slow readers.</td>
<td></td>
</tr>
<tr>
<td><strong>LINESPACE</strong></td>
<td>LINESPACE exceeds 1.5 to 2 times the space between words.</td>
<td>Adjust linespace according to standard typographic rules that suit final design decisions that include typeface, type size, font and line length... etc.</td>
<td></td>
</tr>
<tr>
<td>Typographic Assessments</td>
<td>Typographic Variable</td>
<td>Typographic Problems</td>
<td>Typographic Solutions</td>
</tr>
<tr>
<td>------------------------</td>
<td>----------------------</td>
<td>----------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td><strong>Sense Breaks</strong></td>
<td></td>
<td>Weak sense breaks in some sentences. The sense breaks in most of the sentences and paragraphs could be more logical.</td>
<td>Adjust sense breaks to fit the logical sense of the syntax of language.</td>
</tr>
<tr>
<td><strong>Line Lengths</strong></td>
<td></td>
<td>Sentences in this reading lesson are maximally 10 to 12 words per line. This is the typographic neuritsic for maximum readability. However, children sometimes need to read shorter sentences to improve their information comprehension.</td>
<td>Adjust line lengths to strengthen the readability and comprehension. Line length could be 6 to 10 words per line to allow early readers and ones with reading disabilities to rest more often.</td>
</tr>
<tr>
<td><strong>Typographic Hierarchy and Page Layout</strong></td>
<td>The variation of the visual display, information and typographic hierarchy will allow readers to easily locate information and identify the ranking of this information for comprehension purposes. Several typographic variables could be used to develop an alternative text format that adds logic to content. In this text, there are dialogs that are difficult to follow because of a lack of clear hierarchy.</td>
<td>Use basic typographic variables to clarify information and logical typographic hierarchy that will facilitate the process of reading. Generate a range of layout solution to improve the form and function of text. On the following pages, several typographic experiments are shown using recommended solutions.</td>
<td></td>
</tr>
</tbody>
</table>
The Fish Tale

Ingrid was down by the lakefront one day when she saw Sam and Travis emerge from the brush. Sam swung a tackle box and held their two fishing poles. Travis grasped a line with a fish on it. Ingrid hovered close by. “Will you let me fish with you?” she asked.

Sam didn’t like Ingrid. Her name and the way she spoke were foreign to him. Did she come to Kansas just to bug him?

“No, no and no, in case you still ask,” Sam said with authority.

“I know all things to do,” Ingrid said.

“When we fished in Finland, my dad said I had a gift for catching big ones.”

“Our fishing spot is just for us,” Travis said.

“We made a vow. No one else must use it.”

“Go hug a slug,” said Sam. Five times Ingrid asked to fish with them. Five times she got a no. Then she figured out a plan. The next day, Ingrid ran with her fishing pole to Al’s fish shop. She got a big catfish, slipped off to a big hiding spot, and strung it on her line. She was stationed on the path when Sam and Travis came back from the lake.
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“No, no and no, in case you still ask.”
Ingrid said:
“I know all things to do. When we fished in Finland, my dad said I had a gift for catching big ones.”
Travis said.
“Our fishing spot is just for us.”
Sam said:
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Go hug a slug.”

Five times Ingrid asked to fish with them. Five times she got a no. Then she figured out a plan. The next day, Ingrid ran with her fishing pole to Al’s fish shop. She got a big catfish, slipped off to a big hiding spot, and strung it on her line. She was stationed on the path when Sam and Travis came back from the lake.
The Fish Tale

Ingrid was down by the lakefront one day when she saw Sam and Travis emerge from the brush. Sam swung a tackle box and held their two fishing poles. Travis grasped a line with a fish on it.

Ingrid hovered close by and asked:

"Will you let me fish with you?"

Sam didn’t like Ingrid. Her name and the way she spoke were foreign to him. Did she come to Kansas just to bug him? He said with authority:

"No, no and no, in case you still ask."

Ingrid said:

"I know all things to do. When we fished in Finland, my dad said I had a gift for catching big ones."

Travis said.

"Our fishing spot is just for us."

Sam said:

"We made a vow. No one else must use it. Go hug a slug."
## Intermediate Evaluation

The intermediate evaluation is conducted to assess the process of research, synthesis and to test whether or not the application solutions are accomplishing this designer’s goals.

<table>
<thead>
<tr>
<th>Fieldwork Evaluation</th>
<th>Typographic Experimentations and Direct Interview with Reading Specialist</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>During the synthesis phase, the WRS’s typographic design solutions were tested on children with Dyslexia at NHS. Dera Wagner (2006), reading specialist, indicated that 65% of children with Dyslexia were reacting positively toward the typographic application. After repeatedly exposing these students to the new typographic solutions, 84% percent of the same group with Dyslexia were able to visualize and perceive the newly designed system. Wagner recommended contact with the Wilson Language Training Academy to present this research as a proposal for upgrading the typographic design of the whole Wilson Reading System.</td>
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<tr>
<th>Peer Evaluation</th>
<th>Peer Assessment Through Formal Presentation</th>
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<td>A formal presentation was given to the peers and faculty of the Graduate Graphic Design [GGD] Program in the designated GGD studio at Rochester Institute of Technology [RIT]. In this presentation, the thesis process was presented in digital format exposing thesis problems and process of work. During the presentation, both students and faculty provided this designer with effective feedback and recommendations that were carefully considered throughout the whole study. Many of the GGD peers were concerned why the color of type was not one of the variables in this study. The effect of color on typographic solutions requires extensive research due to the complexities of color on perception and cognition. Another factor is that most of the reading texts and exercises are printed exclusively in black and white. Reading books are printed in color but most of the teachers photocopy the exercises in black and white for mass distribution because of limited reproduction resources.</td>
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<tr>
<th>Survey Evaluation</th>
<th>Interactive Multi-Sensory Survey</th>
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<td>The process of this study was displayed at the Bevier Gallery at RIT in the 2006 MFA Thesis Exhibition. Research findings were exhibited on four 3'x3' wall panels. An interactive multi-sensory survey was a part of this display. A simple questionnaire was mounted on a gallery pedestal with 3 containers of beads. The first had small white beads for voting. The second was labelled YES and the third was labelled NO. Audiences were asked to answer the following question: <em>Do you think educational materials and instructional text need better design decisions? Please share your opinion with me.</em></td>
</tr>
</tbody>
</table>

There were 286 positive answers out of 300. This indicates that the research process was successfully comprehended by a general audience. It also indicates a percentage of people who recognize the importance of the visual display of language and learning outcomes.
Implementation

The final instructional text design was chosen according to its effect on children's reading speed. Design ideations were tested at the Marie Callahan Reading Center located at Nazareth College, Rochester, New York. The director of the center, Dr. Naomi Erdmann, tested the application on two children with Dyslexia in grade five and three other children who are slow readers but do not suffer from Dyslexia. Both groups reacted positively to the application. They specifically indicated the flexibility of the design solutions shown on the following page and said: “it is easier to read than our normal text” (qtd by Erdmann, personal communications, April 2006). The new structure of content and effective typographic hierarchy made it easier for children to read this text; therefore, it was chosen for the final design implementation.
The Fish Tale

Ingrid was down by the lakefront one day when she saw Sam and Travis emerge from the brush. Sam swung a tackle box and held their two fishing poles. Travis grasped a line with a fish on it.

Ingrid hovered close by and asked:

Will you let me fish with you?"

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Five times Ingrid asked to fish with them. Five times she got a no. Then she figured out a plan. The next day, Ingrid ran with her fishing pole to Al’s fish shop. She got a big catfish, slipped off to a big hiding spot, and strung it on her line. She was stationed on the path when Sam and Travis came back from the lake.
Thesis dissemination is sharing the process of thesis research and findings with the public. In the Graduate Graphic Design (GGD) Program at Rochester Institute of Technology (RIT), the second year design students are required to share their thesis experience to demonstrate their accumulated knowledge, research, theory and methods, critical thinking, and in-depth problem-solving process. The following is a summary of events where this thesis was successfully disseminated, and plans for future dissemination.

**Formal Presentation**

The first time thesis findings were shared with the public was in a formal presentation. It was given to the peers and faculty of the Graduate Graphic Design (GGD) Program in the designated GGD studio at Rochester Institute of Technology (RIT). In this presentation, the thesis process was presented in digital format exposing thesis problems and process of work. During the presentation, both students and faculty provided effective feedback and recommendations that were carefully considered throughout the entire study.

**Bavier Gallery Exhibition**

The body of work was shared with the general public at the Bavier Gallery, RIT, in the 2006 MFA Thesis Exhibition. Four 3'x3' presented thesis progress in the following sections:

Panel 1: Overall thesis approach, hypothesis, and subject analysis.
Panel 2: Inside Topic: Typography
Panel 3: Outside Topic: Dyslexia
Panel 4: Observation: Norman Howard Experience

Typographic Experimentations

An interactive multi-sensory survey served as an intermediate evaluation. Audiences were asked if educational materials and instructional text need better design decisions. There were 286 positive answers out of 300.

**Future Dissemination**

This thesis document will be printed and displayed in the:
- RIT Wallace Library
- Graduate Graphic Design Studio
- Embassy of the State of Kuwait—Cultural Attache Division
- Kuwait University Library
- Kuwait University: College for Women Library
- Kuwait University: Department of Art and Design

This designer will attempt to publish this research in an article that targets graphic designers, reading specialists, and educators. It is essential for the public to acknowledge the importance of the benefit of effective design decisions on language, reading and comprehension. Simple changes could significantly add to the function of visible language, and to a more positive experience for young readers.
Evaluation Method

Personal interviews with two reading specialists were conducted to evaluate the final application and to examine the effect of topographic decisions on the development of the reading process. As mentioned earlier, the final application is designed for the public school reader aged 10. The goal of the application is to examine whether effective typographic design, regardless of audiences need, could improve the reading process.

An interview agenda was sent to both reading specialists one week before the interview in order for them to prepare themselves for the interview. The agenda included:

- Interview Topic
- Introduction to the Designer
- The Interviewee Name and Reason of Interview
- Thesis Topic, Goals and Terminologies
- Ideation Sketches
- Interview Questions

The Interview questions are open-ended questions that allow detailed feedback when possible. The questions are:

- What do you think of the typographic approach of the original text?
- What are the problems that readers usually face?
- Is the new typographic design more effective? How could it be tested?
- Do you have any additions or questions regarding the typographic variables?
- What kind of graphic design decisions are necessary to better improve the visual language?
- As an educator and reading specialist, do you face problems with the design and function of instructional text? Did you ever think of redesigning the text or did you only rely on other learning processes?
- Do you think that the new typographic design solutions are appropriate for your readers?
- Are there any suggestions or modifications?

Evaluation 1

Interview with Dr. Naomi Erdmann

The first interview was conducted with Dr. Naomi Erdmann, head of the Department of Graduate Literacy Education at Nazareth College, Rochester, New York. She is also the director of the Marie Callahan Reading Center where a limited number of adults receive diagnostic services and one-to-one teaching in the center. Under the direct supervision of a faculty member, graduate students who are completing work for their masters degrees, as well as earning certification as reading teachers, provide support for those who need help in learning to read (N. Erdmann, personal communications, April 2006).

During the interview, this designer presented a digital proposal of the study to further explain thesis work in progress. The interview took a whole hour and Dr. Erdmann preferred to take more time to revise and evaluate the application. Another appointment was scheduled one week after the first interview in the Marie Callahan Reading Center to continue the evaluation process.
Dr. Erdmann expressed her interest regarding developing readable text. She was rather amazed that graphic designers could address such issues. As a reading specialist, many publishers contact her to edit children’s instructional texts, but she always indicated that her role was limited in editing the language structure only. Most typographic design of texts, as she claimed, are poorly designed. She also added that most publishers and reading specialists believe that visual comprehension could be developed through adding sequential images rather than addressing typographic issues of instructional materials. She was also impressed that this designer chose to concentrate on the visual language and the typographic design of text rather than other visual elements, such as imagery, illustrations, and color. Erdmann tested the application on two children with Dyslexia in grade five and three other children who are slow readers but do not suffer from Dyslexia. Both groups reacted positively to the application. They said “it is easier to read than our normal text”.

Dr. Erdmann said typographic decisions that are carefully considered, such as ones in this thesis, could change how reading specialists evaluate instructional texts. She strongly recommended that graphic designers pay more attention to educational media to develop reliable and legible reading products. Erdmann faces many problems with educational texts and she personally edits the design of documents to fit her instructional needs. Using a sans serif font (particularly the Century Gothic typeface) has made a difference on how she looks at the form of language, she indicated. Dr Erdmann strongly encouraged this designer to continue these studies and to address more educational design issues such as general designs of text books, online usability, and interface design.

**Evaluation 1**  
**Interview with Patricia L. Brockler, MA**

The second evaluation was Patricia Brockler, Director of the English Reading Department, K–6, in the Rochester, New York, City School District. She has been working as a reading specialist for the past 16 years. In that role, her responsibility is to make decisions that impact the literacy learning of students in Rochester, NY, schools. As in the previous interview, this designer presented a digital proposal of the study to further explain thesis work in progress including ideation alternatives. A full discussion of the application took place for 45 minutes where interview questions were further explained. Mrs. Brockler chose to provide her evaluation via email. The following is the evaluation she sent five days after the interview.
Dear Amar,
Here are my thoughts based on your questions (please note my choice of font!) and our conversation:

I am familiar with the characteristics of text--font size, density of text, picture location, etc. and its impact on student ability to process information, but not to the degree that was shared with me in Amar’s presentation. I was amazed, and at times, overwhelmed by all the typographic factors that should and need to be considered to enable all students to become masterful readers. Amar did a wonderfully thorough job of explaining complex thinking and theory in a way that allowed someone who does not have her extensive background to understand how important typographical design elements are to the development of educational materials. I was particularly impressed with how knowledgeable Amar was about the impact different learning disabilities have on a child’s learning and how text construction might alleviate some the problems this causes students when trying to learn from text. The question or curiosity I expressed to Amar was around research. Does she plan on testing out her theories with real students? I would be very interested in finding out whether the changes that Amar made to the sample text she adapted would have an impact on the student’s ability to learn and read.

Amar convinced me of just how important it is for me to be an advocate for my students and the materials they will use to learn to read when selecting texts and working with publishing companies. She has equipped me with information that will allow me to ask pointed questions, the most basic of which and yet most important, do they have a graphic designer familiar with graphic design as it relates to the development of educational materials on staff?

I wish districts were able to set aside funds to consult with graphic designers as part of their materials selection process. We shouldn’t have to be put in the position of being at the mercy of the publishing companies. Text features play such a critical role in the success of children learning to read that it shouldn’t be an option.

As I mentioned in a previous question, as reading specialists we are very conscious and considerate of the features of text that influence students’ reading. We offer professional development opportunities that get teachers involved in looking at each text and discussing “what about the text” might cause our students difficulty. With that said, Amar has brought a whole other level of information to that conversation. Her demonstration of changes in typeface, type weight, spacing, sense breaks, etc. and the impact that these factors have on the readability of text will better inform future conversations I have with the specialists I train to support children’s reading development.

I was completely enamored by Amar’s passion for her topic and am moved by her commitment to the learning lives of children. She has in a very short session provided me with information that will influence all of my future decisions whether it be purchasing materials, providing professional development for reading specialists or preparing individual lessons for students. I am very thankful for having had the opportunity to meet her and benefit from all of her hard work.

Sincerely,
Patricia L. Brockler
Director of English, K-6
Rochester City School District
Conclusion

Reaching Thesis Goals

Like the nature of the design profession, this thesis was a multi-disciplinary research with reading specialists, educators and graphic designers to study the possibilities of developing typographic solutions to facilitate the reading process of instructional text for 10-year-old children with Dyslexia. The results of the research went beyond the target audience and included public school readers of the same age. This inclusion was a result of following a set of effective typographic guiding principles that lead to successful design solutions. The success of the experimental typographic design of the Wilson Reading System (WRS) and the final application was measured in different evaluation processes. This thesis committee, which is comprised of graphic design, reading and field study experts, provided effective developmental input that was carefully considered throughout the design process. The field study at Norman Howard School (NHS), Rochester, New York, provided this designer with opportunities to explore numerous instructional media and learning methods. It was also beneficial to experience the learning process in person and observe 10-year-old children with Dyslexia learning how to read. The newly designed WRS lessons were examined by the head of their reading program, Dera Wagner, and was tested in her reading classes. It started with a success rate of 65% and ended with 88%. The final application was examined by two professional reading specialists in Rochester, New York. They expressed their concern that most educational publishing companies are not paying attention to the typographic design of instructional texts. It is important to “set aside funds to consult with graphic designers as part of their materials selection process. Text features play such a critical role in the success of children learning to read that it shouldn’t be an option;” (Brockler, 2006, personal interview).

Learning Experiences

The chief advisor of this thesis committee and Graphic Design Professor, Bruce Ian Meader, always expressed the importance of typographic form, structure, and communication in the field of design regardless of the media or target audience. Throughout his courses and personal communication interactions, this designer developed personal skills in using typography as an effective visual communication element. His experimentation processes in classes at Rochester Institute of Technology (RIT) inspired this designer to follow the same steps in testing the validity and the effect of typography on instructional texts.

This project is a product of a holistic learning experience at the Graduate Graphic Design Program at RIT where this designer learned to look at design problems from different angles, conduct extensive research, analyze design problems, set goals and objectives, produce multiple design solutions and finally relate the aesthetic forms to both content and context. It was very important to apply these learning experiences in this project to adequately present this thesis on behalf of the School of Design at RIT.

Peer review, field study experiences and outside professional interactions provided this study with a chance to stretch the envelope and include additional audiences to the research process. It allowed professional and social growth that will further affect this designer’s future academic and professional experiences. This project is the first step to expand research on the effect of graphic design on human environments, especially education.
**Design for Society**

In the design profession, designers tend to address environmental problems that individuals face on a regular basis. There are many environments that need graphic design emphasis to improve the quality of human life experiences. There are several possibilities of research topics that could use visual communication approaches to improve the quality of cognitive and physical human environments. Design could be used as a facilitating tool to help humans solve environmental problems and apprehensions that affect their overall growth and development. Design for education is a topic of concern to many professional designers and educators. This thesis project is an addition to previous research for educational purposes that could help educators build healthier learning environments. Facilitating the process of reading for 10-year-old children with Dyslexia was the main study goal. Reading is the essence of learning and is the main source of knowledge and education enrichment. Therefore, it is essential to help children become independent readers to make them strong learners and active members of educated societies. According to reading specialists and designers who were interviewed in this research, graphic design could improve the efficiency of learning materials and is an essential building block of visual communication. The findings of this thesis will add to the knowledge of graphic designers when designing for complex issues that demand intensive research and direct user observation. Above all, it reflects the influence of graphic design on learning environments and encourages education instructors to use effective design solutions when needed.

**Universality of Effective Design**

Effective design is universal design. The educational community experiences numerous student populations. These students have different educational needs because they are different people that carry different intelligences. And since it is rather difficult to individualize instructional materials, it is recommended to design and deliver instruction that responds to most of these needs. This thesis study serves this goal and is an example of how simple design decisions could develop a universal approach in design. Milton Glaser once said: “bad design is just plain mean while good design presumably serves many citizens,” (qtd in DTG Online Magazine, para 1). The educational community uses many assistive technologies to deliver their goals. Why not use effective design decisions to do so? Design could serve as a catalyst for concept development, and as a problem strategy for simple yet important educational tools such as instructional texts. With effective design, learning and information-processing could be improved significantly.

**Future Plans**

This designer is attempting to publish this study in scholastic design, reading and educational journals. It is necessary to share with the public beneficial findings that could serve social and educational needs. Another goal is to present this topic in professional conferences where it could be shared with others who have similar interests. This designer is also joining the Department of Art Education/Therapy at Florida State University as a graduate doctoral student. She is planning to use visual communication concepts to further expand her pragmatic research in art therapy to serve people in need. It is important for people in other visual arts profession like art therapy to recognize the effect of design on their clients. It is essential for such communities to bridge themselves with other disciplines to define the human experience; and design is one of them.
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<tr>
<th>Inside Topic</th>
<th>Aesthetics</th>
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<tbody>
<tr>
<td></td>
<td>A branch of philosophy dealing with the art, taste, and the creation and appreciation of beauty. It is also a particular theory of the conception of beauty or art: a particular taste for approaches to what is pleasing to the senses and especially sight.</td>
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<tr>
<th>Inside Topic</th>
<th>Design Variables</th>
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<tbody>
<tr>
<td></td>
<td>Controllable visual specifications used to shape any visual composition such as size, shape, weight, tone, texture, position, orientation and color.</td>
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<tr>
<th>Inside Topic</th>
<th>Dissemination</th>
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<tbody>
<tr>
<td></td>
<td>Plans for future audience interaction. How could this product or information be distributed or used in the future. (Meader, 2006)</td>
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<tr>
<th>Inside Topic</th>
<th>Function</th>
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<tbody>
<tr>
<td></td>
<td>To serve a purpose, role or goal. What something is used for and how it works.</td>
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<tr>
<th>Inside Topic</th>
<th>Graphic Design/ Visual Communication</th>
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<tbody>
<tr>
<td></td>
<td>The art and profession of selecting and arranging visual elements such as typography, imagery, symbols, and color to convey a message. Sometimes graphic design is called 'visual communication,' a term that emphasizes its function to communicate ideas and information. An important part of the designer’s task is to combine visual and verbal elements into an ordered and effective whole. Graphic design is a collaborative discipline: writers produce words, photographers and illustrators develop images that designers incorporate into visual communication solutions.</td>
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<tr>
<th>Inside Topic</th>
<th>Gestalt</th>
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<td></td>
<td>Gestalt psychology was founded in 1910. It states that perception involves the use of prior knowledge in the construction of a model of the world. Gestalt psychology is based on innate laws of perceptual organization, and that the whole is greater (and different) than the sum of its parts.</td>
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<tr>
<th>Inside Topic</th>
<th>Hierarchy</th>
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<td>Typographic hierarchy is a visual organization that establishes priorities and distinguishes primary, secondary and tertiary information. (Meader, 2006)</td>
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<tr>
<th>Inside Topic</th>
<th>Ideation</th>
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<td></td>
<td>The generation of conceptual sketches and ideas—a range of preliminary design approaches. (Meader, 2006)</td>
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<tr>
<th>Inside Topic</th>
<th>Implementation</th>
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<td></td>
<td>How the project was refined, developed and produced to its final form or application. (Meader, 2006)</td>
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<tr>
<th>Inside Topic</th>
<th>Instructional Media</th>
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<td>Useful visual materials that are used to facilitate the process of learning. Media could include: objects, models, diagrams, charts, graphs, motion pictures, posters, maps, pictures, slides, filmstrips, and digital presentations.</td>
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<th>Inside Topic</th>
<th>Precedent</th>
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<td>Existing projects, case studies, models that have meaningful relationship to a study. (Meader, 2006)</td>
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<tr>
<th>Inside Topic</th>
<th>Problem Solving Process</th>
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<td></td>
<td>The process of solving the design issue. The steps that a designer takes to overcome the design problem.</td>
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**Outside Topic**

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<tr>
<th><strong>Assistive Technology</strong></th>
<th><strong>Educational Tools</strong></th>
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<tr>
<td>Technological tools used to help a person with disabilities. The kind of tools are determined according to clients' needs.</td>
<td>Collection of instructional materials for teaching professionals. They could include lesson plans, forms, letter forms, teaching tips, software, curriculum special planning, related and educational internet resources, games and puzzles, discussion forums, and message boards.</td>
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<tr>
<th><strong>Communication</strong></th>
<th><strong>Field of Vision</strong></th>
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<td>The word communication comes from the Latin word <em>Communis</em>, which means 'make common to many.' Communication is how we share meaning; it is a process of exchanging information and making yourself understood by others.</td>
<td>The surrounding area a person could see without moving their eyes or head. It is used in reading to follow sentences and visualize words.</td>
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<th><strong>Disability</strong></th>
<th><strong>Learning Disabilities</strong></th>
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<td>A physical or mental barrier that prevents someone from functioning at a normal rate.</td>
<td>This is a generic term that refers to a heterogeneous group of disorders manifested by significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning, or mathematical abilities. These disorders are intrinsic to the individual and presumed to be due to nervous dysfunctions. Even though a learning disability may occur concomitantly with other handicapping conditions or environmental influences, it is not the direct result of those conditions or influences.</td>
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<tr>
<th><strong>Dyslexia</strong></th>
<th><strong>Language</strong></th>
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<td>“A specific learning disability that is neurological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede the growth of vocabulary and background knowledge.” (IDA: International Dyslexia Association, 2005) People with Dyslexia are individuals with special educational needs who sometimes need special education.</td>
<td>In this study, language is a systematic means of communicating ideas and feelings by the use of conventionalized signs, sounds, gestures, or marks to convey a message. The information and transformation of admissible expressions.</td>
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<tr>
<th><strong>Reading Kits</strong></th>
<th><strong>Neurological Problem</strong></th>
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<td>Special educational tools to teach reading. These tools could be books, flash cards, technology... etc.</td>
<td>An abnormal situation that occurs to the nervous system especially in respect with its structure and function. Neurological problems can cause physical and mental disabilities.</td>
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**Outside Topic**

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<th><strong>Special Education</strong></th>
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<td>Programs and services for children with special needs, such as the Norman Howard School for Children with Disabilities.</td>
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**Children with Special Needs**

A child who has disabilities or who is at risk of developing disabilities that may require special educational services, such as children with Dyslexia.

**Visual Discrimination**

The ability to detect differences in objects, forms, letter or words.

**Visual Learner**

A visual learner is someone who learns best by using their eyes to see information. They learn best by seeing words and numbers printed in text form or by using graphics and pictures, observing real objects and events, and using maps, charts, graphs and other visual aids.
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