Design for Education

by

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Abstract

This project is a study on the design practices that are often used in educational materials, specifically in handouts and worksheets. After looking into worksheet and handout design I have created a document titled *Design for Education* that demonstrates to K-12 educators how to create more user friendly materials and how to improve the clarity of worksheets and handouts. In the document I have referenced design concepts including the elements of design which includes; line, shape, form, color, value, texture and space as well as the principles of design which includes concepts like emphasis, balance, and contrast. My book includes chapters on various design concepts that apply to worksheet and handout design. For example; working with layouts, choosing fonts and imagery, and emphasizing titles and subtitles. At the end of the document I included a selection of examples of worksheets that are implementing these concepts both correctly and incorrectly. Overall this project is a study on educational materials from the perspective of a graphic design student. Any document that includes text and imagery is designed, including educational documents. The purpose of this study is to represent the ways that graphic design can improve the educational experience.

Keywords: Graphic Design, Information Design, Worksheets, Handouts, Forms, Clarity, User-friendly Design

Every book, worksheet, presentation and printed or online learning material has to be designed by someone, and even if they are not all treated as design projects, the decisions that go into how the page will be organized and how the information will be presented greatly affects the way that the viewer processes the information. Throughout this project I will be presenting how educators can use graphic design concepts to their advantage to present easily digestible and aesthetically pleasing learning materials.

My final product for this project is a designed book that educators can read to learn how to use basic design principles and choose materials for their students that are easy to understand. It is sectioned into eleven chapters. The chapters include; an introduction, questions to ask before designing a worksheet, creating categories of information, designing with an imaginary grid, hierarchy and spacing, font choices and alignment, content and vocabulary, working with color, interactive design elements, the design process, and resources and examples.

As the book progresses through chapters, it should take the reader through the process of designing a worksheet applying different design principles as well as examples of these principles being used successfully and unsuccessfully. As a final result I would like educators to be able to better understand how to reach their students as an audience, and create educational materials that are not only easier to understand but are designed to work towards the students long term memory.

Literature review and theory

One of the books that I have used as a reference for my argument is *The Form Book* by Borries Schwesinger, this book outlines how to create forms that are easy to use and easy to understand.

The reason I chose this as a reference is because worksheets are a type of form. Worksheets are designed so that the student has to digest the information and fill out the sheet to the best of their abilities like any user would be required to do with a form. This book covers topics from the organization and layout of a form to the language choices and content that will be included in the form. The concept of designing at Macro and Micro levels comes from *The Form Book* as well. Macro levels of design include things like overall layout, color choices and header and body font choices while micro level design are smaller design choices like the design of question and answer boxes. The book even goes as far as explaining how to remain consistent with wording. A quote from the form book says "every form involves a kind of dialogue, and this can take place from three different viewpoints: as a set of questions to the user, a declaration to the provider, or from a neutral perspective. It is important to settle on one of these and maintain it throughout."(Schwesinger, 2010, p. 168).

The second book I have chosen as a reference is *Clear and to the Point* by Stephen M. Kossyln, this book is about the powerpoint program and the do's and don't of creating a powerpoint presentation. I chose to include this book in my research because it is a helpful explanation on how to present information to a large group of people in a straightforward and clear way. It talks about everything from font choices, to image placement and even the order in which you should walk your audience through information.

Clear and to the Point informs the reader exactly what to do and what not to do when designing for clarity and designing to present to a group of people. I was inspired by information from *Clear and To the Point* like "avoid all uppercase, all italics, or all bold."(Kosslyn, 2007, p. 62). "Use different colors only for emphasis or to specify different classes of

information,"(Kosslyn, 2007, p. 64). "If the contrast or luminance is low, so that fonts that should be visible can barely be seen, use serif fonts." (Kosslyn, 2007, p. 72). And "if you use a patterned background make sure that it does not bury the text and that it is not too salient as to distract from your message." (Kosslyn, 2007, p. 70). Almost any mistake that someone could make to damage the clarity of a presentation is included in *Clear and to the Point.*

An element of *Clear and to the Point* I found especially interesting was the way that a powerpoint presentation should be paced. *Clear and to the Point* teaches the reader that when you are transitioning from one slide to the next, if the information is going to be complex on the next slide, an extra slide that is dedicated to preparing the viewer for that next slide should be included. Throughout the book there was different information relating to the progression of a powerpoint and how to pace the viewer through a presentation. With worksheets teachers won't always be able to add extra pages just to introduce the next page, but they can pace the worksheets to where the student will read a header explaining the image they are about to see before moving on to that part of the worksheet. My book included information about where in the progression of information each element should be placed, based on the complexity and importance of information.

Evidence

Millers law is a law that was created by psychologist George Miller, it was originally published in The Psychological Review, 1956, vol. 63, pp. 81-97. A good summary of the information that I have focused on from this argument is "There is a clear and definite limit to the accuracy with which we can identify absolutely the magnitude of a unidimensional stimulus variable. I would

propose to call this limit the *span of absolute judgment,* and I maintain that for unidimensional judgments this span is usually somewhere in the neighborhood of seven." (Miller, 1956, p. 1).

This argument also highlights the importance of grouping information into smaller sections or "chunks." As the information progresses, it is okay to expand the amount of information presented. In other words, each section can be slightly longer than the last. Since the viewer is learning the information as they go it will be easier to understand a longer paragraph towards the end of the learning experience than at the beginning. The essay says "we must recognize the importance of grouping or organizing the input sequence into units or chunks. Since the memory span is a fixed number of chunks, we can increase the number of bits of information that it contains simply by building larger and larger chunks, each chunk containing more information than before." (Miller, 1956, p. 1).

To help break down the process of designing worksheets even more, I included information about the design process. The design process is a way of breaking down larger projects into smaller steps that are more easily manageable. It is a way to think about problem solving as a cycle that is continuous and doesn't end until the problem has been solved. The steps included in the design process are; defining the problem, brainstorming solutions, developing solutions, and gathering feedback or testing your design. Once your design has been tested the process repeats. You define the problems that came from your feedback, brainstorm solutions to those new problems, and develop new solutions and gather feedback again until the feedback you receive is positive. Although teachers most likely don't have the time or resources to continuously test their worksheet designs on a group of students, filling the worksheets out themselves as a way of testing their designs is an accessible approach to create stronger

worksheets.

My interpretation of the design process steps directed towards teachers in *Design for Education* was to first ask questions about the audience; who will be viewing the handout, the content that needs to go into the handout, and the setting in which it will be viewed. I included questions like how old is the audience, what do they already know about this subject, what content needs to be included in this handout, how long do the students answers need to be, etc.. then, to write out the text and gather all of their content together on to one file or folder on their computer. After collecting all of the information that needs to go into the handout, start brainstorming ways to lay out the information through templates or grids that they sketch out by hand with a pencil and paper.

After brainstorming and sketching ideas, the next step is to create a digital version of the handout. It could take multiple iterations to get the handout to the point where they think it is ready for printing. Once the first draft is completed, print it out. The design should then be tested either by the teacher or they can have someone else test it by filling it out. Some questions they should ask themselves during the testing stage are; is there adequate space to fill out each question? Is it obvious which elements are more important and least important? And is it obvious which elements on the page belong together. After testing the design, they should write a list of things that need to be fixed, brainstorm solutions to those issues, and repeat the process of creating and testing until the handout design is acceptable.

Going through all of these steps of the design process and learning about design principles helps reach the objective to better capture the attention of students through the printed materials that will be used in the classroom. Throughout my experience designing this book, one

of the principles I have focused on is the retention of the users in general, and specifically the retention of the student while they are using a learning material. The Primacy/Recency effect is an observation that information presented at the beginning and end of a learning experience has the potential to be retained better than the information that is presented in the middle. This theory was developed by Hermann Ebbinghaus through a series of studies he performed on himself. Based on this theory, the ideal way to present information to a student would be to introduce any new information at the beginning of a worksheet, followed by a re-enforcement of already known information towards the middle of the worksheet and then again presenting the new information at the end of the worksheet as a conclusion.

This theory also relies heavily on the amount of time that the lesson takes up. The time when a student has the most potential to retain information is called “prime time.” If a lesson lasts 20 minutes, the prime times at the beginning and end of the lesson would take up larger portions of that time. If a lesson lasted 80 minutes the prime times would take up a smaller portion of that time. An article on the Primacy/Recency effect states “As teachers, adjusting class scheduling and timing may not be possible. What is possible, however, is making the most out of the time you are given by presenting information in a way that makes full use of students’ prime-times. As mentioned above, there are ideal times to present certain content during a lesson. Perhaps most important, however, is that soon after grabbing students’ attention with a clearly stated Learning Objective, it is crucial to begin presenting new material while the students are ready and able to take in new information.” (The Primacy/Recency Effect 2014).

Aside from the order and categorization of information, I also focused on stylistic choices. Although color theory is a subject too complex to explain in just one chapter I was able

to include some components of it in my book. As a brief summary, color theory is both the science and art of using color. It explains the psychology of the way humans react to colors. Why some color combinations evoke a positive reaction and other color combinations drive people away. It also talks about color associations and why humans associate certain colors with events, places, memories, objects, etc.

In *Design for Education* I included a brief description of color theory, examples of colors that would go well together, when to use color and how to use color as an emphasis. I believe that this section was essential to the book because color theory is heavily connected to communication. Instead of explaining color theory to an extent, I included bullet points of information that I believed would be helpful to teachers creating learning materials. For example, keeping color to a minimum to avoid an overwhelming amount of color for the viewer's eye to take in, and sticking to colors that are more calming like blues, greens, neutral colors like brown and tan rather than repeatedly using colors like red and orange.

To highlight important information it can be helpful to use colors like red because it will stand out more to the viewer and they are more likely to remember it later. My color examples included the color code for teachers who have access to programs with extensive color choices, examples of complementary color schemes, triadic color schemes, analogous color schemes and monochromatic color schemes. I also included warm vs cool color schemes and examples of these schemes in use. Although many teachers don't have access to color printing for mass producing worksheets, there are also a lot of worksheets that are now completed online, which is why I included this section in the book.

Another concept that I pulled from is user-experience design. User-experience design is a newer concept because it is directly related to web design. It focuses on clarity, user friendliness and the ability for a design to hold the retention of the viewer. The first concept that I have pulled from user-experience design and included in my book was providing stepping stones for the viewer. If you include a progress bar, whether it is included on a website or the side of a printed page, it helps the user know where they are in the process of the task they are completing, which improves the motivation of the user.

Consistency is another concept that is related to User-experience design. Consistency is actually included in not just user-experience design but many other design related theories as well, but user-experience design talks about using consistency as a visual language that makes the design intuitive to the user. For example, making all clickable buttons on a website the same shape, size, and color. That way the user knows to expect for that element to be a clickable button. This concept can also be applied to designing worksheets. If the first question on a worksheet is an essay answer and is presented as a question that is underlined and a box to fill in the answer, all essay questions should be presented using that same visual language.

This also applies to the wording of a worksheet. A simple example is the way that questions are worded. If the first question on a worksheet reads; “what is your name?” The second question should not read “I am __ years old.” It would make more sense to the user if the second question read “what is your age?” Keeping both the visual and linguistic language of a worksheet consistent throughout the entire experience for the user is both a concept of the principles of design as well as the principle of “repetition” and user-experience design as the principle of consistency.

In addition to repetition, the principles of design include; contrast, balance, emphasis, proportion, hierarchy, rhythm, pattern, movement, variety, unity, and white space. One of the other principles I highlighted in my book was white space. White space is any space on a page that appears to lack any form of a visible mark. A common mistake when creating any form of printed materials is to try and include as much information as possible on to one page. Although this saves space and ink, it is not the most user friendly way to create any learning materials. Including white space gives the eye more room to rest, it allows the viewer to digest one thing at a time on a page. If there is a lack of white space on a page the viewer will find themselves moving their eye quickly from one thing to the next without being able to focus on any one piece of information. This principle is repeated in my book where I included layout example.

Because I was writing about creating clarity within a design, focusing on how elements of a page work together and are perceived was an important part of my research, gestalt theory focuses on why elements appear to be parts of a whole. Gestalt theory was first written about by Christian von Ehrenfels, an Austrian philosopher. It is defined as "The whole is more than the sum of its parts."(Sternberg and Sternberg, 2012, p. 13). There is no direct english translation for the word gestalt, but loosely it translates to pattern, structure or organized unity. Designers talk about gestalt as a way to create the illusion that elements on a page are part of a larger design system. There are six gestalt principles; proximity, similarity, figure-ground, continuity, closure, and connection. Each principle talks about the way that people perceive different objects and their environment as well.

The first principle of gestalt is proximity, proximity is the idea that when a person sees a group of objects, the objects that are clustered together are going to be perceived as a single category of objects. The principle of similarity states that objects with similar aesthetic values

will be perceived as belonging together. For example, objects that are the same color, size or texture will be grouped together. The principle of closure explains that people are more likely to view objects as a whole than acknowledging the gaps that the objects contain. The viewer will most likely mentally fill in the gaps.

Each principle included in the gestalt theory relates to worksheets in the way that they are designed and organized. If two photos are placed closely together the viewer will perceive them to be part of one category. If there are multiple questions written pink, and other questions written in red, the viewer would perceive the red questions to be part of a category and the pink questions to be part of another category.

Lastly, user testing was also included in the book. This is a concept that I used myself while creating the book, as well as presenting it as a focus in my book. After creating a first draft of any design or worksheet, it is important that you either test it yourself or have someone else test it for you. Making sure that the worksheet is easy to use is a necessary step to take. Some things to test for are making sure that there is enough space to fill in answers, that the order of information is intuitive enough that it doesn't require an explanation and that overall, it is obvious which information is most important and which information is the least important.

Conclusion

Overall, the goal for this book is to act as a simple explanation directed towards educators which entails how to apply design thinking and design related principles to worksheets and handouts in the classrooms. The book includes sections on things like hierarchy, grids, color theory, white space, and how to properly select images for educational materials. At the end of the book,

references with links to sites for free photos, illustrations and design tools are available. This book is designed to be simple enough that it is not unreasonable for someone with a busy lifestyle to invest time in reading while also including a selection of valuable topics that educators wouldn't necessarily already know but could expand on the knowledge they already have. If this book is successful, it will improve the quality of learning materials created by educators and for students in elementary, middle, and high school.

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