

Teaching By Design Using a Question Template To Transform Student Writing

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ABSTRACT

The purpose of this article is to suggest teacher's use design thinking to create question-based assignments to transform student writing.

The problem is that it is difficult to teach someone something they think they already know. Students have learned one mindset, one normal path for writing papers and when faced with a new method challenging them to try a new and different path they are resistant.

My method for breaking through this resistance was to create a question-based template that focused on teaching a method best for creativity. The template was based on three different stages of inquiry, why, what and how. The template was designed to cue the brain to cycle through different regions of the brain. Each week a student was assigned one of twelve management topics concerning a top innovative company. The student was to use the question template to answer all the questions. The research study was 10 semesters with a total of 295 students completing 3,540 papers. The papers were reviewed, evaluated and ranked by the quality of the answers. A Goldilock's formula using the paper's word count was used to measure and identify the "just right" number of words used by each student to complete the assignment. The results: approximately 80 percent of the students showed little or no change in their writing, 10 percent of the class writing was greatly improved, and 10 percent of the students' writing was deficient.

The conclusion reached was that the use of a question template was most effect for a student who was willing to put in the time and effort to research and think through all the questions to provide a holistic answer. The use of a word count as a measure was helpful in providing feedback for the purpose of communicating to the student's suggestions and examples for improvement. The questions that sought personal feedback concerning the "walk away" message, the lessons learned, and what was cloudy or unclear about the assignment were helpful for re-designing the model.

Keywords: design thinking, template, creativity, integrated thinking, Goldilock's formula, teaching method

INTRODUCTION

The Darwinian world is a world based on operational efficiency. Evolution is an algorithm where survivors survive because they are the most efficient at solving life's problems. Nature's design algorithm is based on the principle of least effort. Surprisingly, when it comes to people and written communication the principle of least effort is at work. George Zipf wrote *Human Behavior and the Principle of Least Effort* in 1949, theorizing that people have a tendency to communicate with the least effort and this theory is known as Zipf's Law (Zipf, 1949 Viii).

In designing the question template Zipf's Law was a concern. Cognitive psychologists have written in depth about the brain's ability to use the least amount of energy to store and process large amounts of information. For maximum efficiency the brain takes a minimalist approach and uses redundancy to store information in different regions of the brain.

Consequently, the principle of least effort is critical to consider in the teaching by design process. It is this principle that drives the brain to create different mindsets for solving different problems. The human brain has the ability to learn most any task. When the brain is faced with a problem that it needs to solve it will create the mental circuitry until it can accomplish the task with maximum efficiency. This clever tactic accomplished two things of chief importance for survival. The first is speed for fast decision-making. The second is energy efficiency. The brain is always searching for ways to minimize the energy required to solve problems (Eagelman, 2011 p. 71-72).

In 2004, Roger Martin, dean of the Rotman School of Business at the University of Toronto, presented a new paradigm for business by asserting that all business people need to become design thinkers. In his seminal 2009

book *The Opposable Mind*, Martin's message was that business people to build new and better models to drive creativity and innovation (Martin, 2004) (Martin, 2009 p. 99).

In 2009, Tim Brown, the CEO and president of IDEO, one of the most innovative companies in the world, in his definitive book, *Change By Design*, presents design thinking as a way of not only seeing the world but also as a method to apply constraints (Brown, 2009).

In the book *Nudge*, Richard Thaler and Cass Sunstein presented the idea that when it comes to decision-making there is no such thing as a neutral design. Doctors design treatments, sales people design displays and teachers design assignments. The authors call the people who have the responsibility for organizing the context in which people make decisions *choice architects*. Simply put any person who designs the context for influencing how one thinks or decides when making a choice is actually a design thinker (Thaler & Sunstein, 2009).

In 2003, best selling author Peter Block, suggests *The Answer to How is Yes*. Block believes that creativity and transformation comes more from pursuing profound questions than seeking practice answers. Moreover, he expresses the idea that there is something in asking the persistent question of how.

In 2015, Adam Morgan, coauthor of *A Beautiful Constraint*, presented the value of using propelling questions to drive creativity. A propelling question is a question that requires a person to use integrated thinking to connect two different ideas together. It simply propels the user of the path of normalcy onto a new path of transformation.

There is a depth in the question, "How do I do this?" that is worth exploring. The question is a defense against the action. It is a leap past the question of purpose, past the question of intention, and past the drama of responsibility. The question "How?" -More than any other question-looks for the answer outside us. It is an indirect expression of doubts...

Choosing Freedom, Service and Adventure,"
-Peter Block, *Stewardship*, (p. 234)

USING A TEMPLATE WRITING A STORY

Tina Selig, best selling author and the executive director of the Stanford Technology Ventures Program, is a strong advocate for using a template for increasing student creativity. Dr. Selig, in her book *Insight Out* explains how the skills of creativity and innovation can be learned and taught to every student (Selig, 2015). Selig is a great believer in story templates as a teaching method. Companies as well as individuals have stories and if a company's story is interesting it will generate publicity and support from the public.

All companies have stories and successful companies have a clearly articulated story that presents a clear and well thought out business strategy. At the core of each business and each story is a structure that Selig calls the "story spine" structure. By using this structure as a template for writing a paper or doing a project, the teacher can greatly increase not only what to do but how it should be done.

USING A QUESTION TEMPLATE FOR WRITING ASSIGNMENTS

The template idea works in almost every situation. Stories are the building blocks of company culture and provide a solid structure for student writing assignments. A question-based template works in most situations to provide structure and process to a writing situation. Consequently, the idea for changing a story template into a question-based template for analyzing innovative business companies was created and implemented into an upper division course in principles of management.

DESIGNING THE QUESTION TEMPLATE-STRUCTURE, PROCESS AND FEEDBACK SYSTEM

Start by using a curiosity-creating question that sets the stage for the list of questions that will follow. The question that I prefer to use is "Why is this a challenge?"

The second step is to create a framework of questions based on three different levels of information requiring the student to use an integrated thinking approach.

Why Questions-direct curiosity
What Questions-direct knowledge
How Questions-direct solutions

In 1949, the British philosopher Gilbert Ryle distinguished between knowing how, (the knowledge of skills) and the knowing of what (knowledge of facts and events). More recently, a team of researchers at UCLA discovered that participants who were asked both how and why questions during a magnetic resonance session showed different parts of the brain responding. The how questions engaged the left-brain circuitry and the why questions engaged the right hemisphere (Ryle, 1949).

The conclusion was that a well-constructed question-based template requires a what, a how, and a why questions for whole-brain engagement. The student needs to use integrated thinking to answer all the questions. This idea of providing multiple points of view was expressed by Alan Kay, noted Apple fellow who was quoted to say, "A change in perspective is worth 80 IQ points."

ELEMENTS OF THE PROCESS: TWO CRITICAL QUESTIONS

The language of the framing questions is accomplished by using two "why questions." The first question is "Why is the Challenge Here?" The second question is "Why is this important? The purpose of these questions is to establish a frame for curiosity.

Question-based template for a Business Management Class

The Topic is Strategy The Company is Google

Why Questions (curiosity)

Why is this a challenge?

Why is this Important?

Why is this Valuable?

What Questions (knowledge)

What is special about how they handle this topic?

What was the limiting factor?

What surprised you?

How Questions (solutions)

How do they handle this topic?

How do they motivate the company members?"

How do they communicate?

Student Feedback Questions (engagement)

What is the Walk Away Message?

What is the Lesson Learned?

What is Cloudy or Clear?

Measurement Questions (feedback)

What is the Word Count?

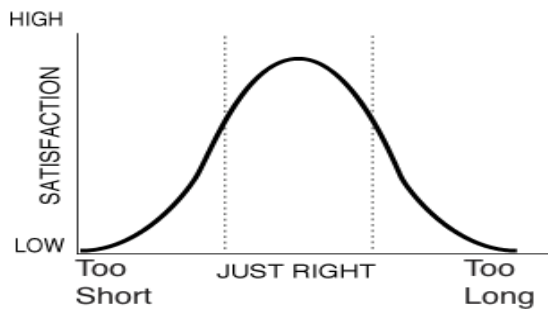
What are the Sources?

USING A GOLDILOCKS' FORMULA TO MEASURE STUDENT EFFORT AND TO PROVIDE FEEDBACK FOR IMPROVEMENT

The Goldilocks principle is derived from a children's fairy story "The Three Bears" in which a little girl named

Goldilocks finds a house owned by three bears. Each bear has its own preference of food and beds. After testing all three examples of both items, Goldilocks determines that one of them is always too much in one extreme (too hot or too large), one is too much in the opposite extreme (too cold or too small), and one is "just right".

Goldilocks Principle



The purpose of the formula was to use the word count as a means for directing the students to either increase, decrease, or maintain the quality of their answers.

The plan was to do this with a minimum set of instructions given through class emails and the use of a series of templates and a checklist, with the intent of having the students become more self-directed, self-organized and self-motivated. I wanted the students to be more open and more engaged in their writing by using personal examples and opinions about the value and the difficulty of the assignments. A common problem in my previous online class was the constant requests by students concerning the length of the paper, how many sources, how many examples, and how could they improve their papers to achieve a perfect score.

Each paper was required to have a word count posted at the end of the paper. The purpose of the word count was to provide research data so that I could learn the average word count for each assignment. Then, after each completed assignment I would email the class the average word count, the average score and suggestions for improving the papers. The method for measuring word count was by *the wisdom of crowds*, mainly the collective opinion of the class (Surowiciewski, 2004). This principle was the same principle that Google used to determine the effectiveness of their search results (Brandt, 2011 p. 117).

My expectation for the end result would be the word count graph resulting in a U-shaped distribution known as the *Goldilocks effect*. My expectation was that I could use the Goldilocks effect as a measuring device to determine the effectiveness of the design for the papers and to provide suggestion for either adding more information or for deleting extra information.

USING THE RULE OF 200

The Rule of 200 is a sports heuristic that I learned when attending a coaching clinic. The speaker spoke on his experience of scouting and selecting a player for a team. His idea was to study over 200 plays to get a feel for the quality of the player. He also suggest that this rule may be applied to most any sport or activity, that 200 was the minimum number that was needed to determine if the player was a top talent. I adopted the idea in the fall of 2015 and started to review 200 papers to find the "best paper" within the 200. It was not difficult to find the top ten papers.

At this point I had three simple rules: the paper had to be entertaining, the content had to flow seamlessly from one question to the next and there could be no duplication, extra words, extra ideas, or scattered content. Once I had selected the final two papers, I contacted the students and interview them about their techniques and methods. Additionally, asking their permission to use parts of their papers to be posted as examples for future students.

Finally, the Rule of 200 provided me with the discovery that the class could be divided into three types of students: the bottom 20 students were named reducers, the next 80% were named satisfiers, the top 20% were named

transformers, and the top 5 students were labeled “Star Quarterbacks.” It was from these outliers that I learned what to do and what not to do in the design for future classes.

THE PURPOSE OF DESIGNED REDUNDANCY

Students often complain that the questions in the writing assignment are redundant. Redundancy and efficiency are two repelling concepts where redundancy is often associated with inefficiency. The questions are redundant but they are designed that way. The idea is to maintain a balance between redundancy and efficiency. Building in redundancy is crucial to ensuring continuity and effectiveness in business operations, rocket launches, and writing assignments.

Redundancy is a means of repetition that connects ideas and improves understanding. Cognitive psychologist George Miller of Princeton argues that the number of topics or objects that an average human mind can hold in memory is 7, plus or minus two. This idea is referred to as Miller’s Law. By using a story question-based template that requires the student to answer a question from 7 different points of view, the result is the student is required to engage different regions of the brain (Miller, 1956).

Eric Kandel, neuroscientist and winner of the Noble Prize for his work on memory, demonstrated that different regions of the brain are specialized for different purposes. Asking, what is something, and, how to do something, requires thought from different regions of the brain. By using a model design the teacher can require the students to engage more than one region of the brain. Short-term memories are not only stored separately but they are stored in more than one region of the brain. The answers to the questions need to be integrated together to create a holistic solution (Kandel, 2006).

ASSURANCE AND REVIEW OF LEARNING

The objective of this paper is to present a new method that not only improves student’s writing but also their creativity. By using design thinking teachers will accomplish a fundamental change in how they teach. Creative writing is a mindset and when design thinking is applied to education, the result is what Thomas Kuhn labeled a paradigm shift (Kuhn, 1956).

The first step for the teacher is to establish in the student’s mind that something is possible and then probability will occur. When fellow colleagues hear that students taking the class are required to write a series of papers that average approximately 1000 words their reaction is they will have a difficult time completing the work. In short, they are skeptical and question the validity of the assignment. It is a major challenge to have other teachers try this method.

From the fall of 2014 through the fall of 2016, 295 students completed the Principles of Management online class. During that time each student was required to complete a series of 12 papers focused on a company and the application of material from the textbook, the internet and other sources. During this period 3,540 papers were reviewed and evaluated based on quality and creativity.

At the end of the first year the average length of the papers was 935 words. At the end of the second year the average length of the papers was 955 words. Starting in spring of 2016, there was some adjustment on the wording of the questions and the Cloudy or Clear was added. At end of the spring and summer class the average word count moved up to 1005 words. A review of the class achieved by interviewing students and receiving feedback from the Course Management System comments showed that the increase in the word count was due to improved feedback given through emails and comments made through the course management system.

Eric Kandel’s research on memory and learning showed that repetition is the key to learning. Practice not only makes permanent as shown by the Nobel winner’s research on learning, repeated practice also makes permanent. Information in short-term memory moves into long-term memory (Kandel, 2006).

By using the same model for every assignment each week the task of writing became easier. By building in redundancy the questions were easier to answer and examples both from references and from personal experience of the students were more accurate and engaging. Repetition not only makes perfect, it also makes permanent.

Perhaps, the most valuable information came from the student engagement questions: “What is the walk away message?” “What is the lesson learned?” and “What is cloudy or clear?” This information provided the data for

making adjustments to the model not only during the semester but for the next semester's classes.

WHAT THE STUDENT LEARNS

The student learns that by using a question-based template the task of writing becomes easier with each repetition. By writing all of the papers on one company and by understanding that creation of each company is like baking a cake, you have to have all the ingredients in the right proportions and then the “heat” of the business environment will do the rest. Moreover, when a company like Google, Apple, or Microsoft has a breakthrough it is not one thing, but a series of things that are integrated and come together to create the innovation. The student learns the value of a story based on structure and most importantly the importance of a feedback loop where the student is constantly thinking about what they have done and how they could do it better.

The student learns the importance of process, a series of actions taken in order to achieve a particular end. It was our objective to design an assignment where the students not only learned the process of what makes a “great company” but also the process of what makes a quality paper.

Finally, the student learns that to iterate on each paper and at the end of the semester they have a design that if followed will produce an interesting paper with a theme, structure, and flow.

WHAT THE TEACHER LEARNS

The teacher learns that students work better when they know what the goal of the assignment is and why. Students perform better when they see the value in the assignment and are not only learning something, but also learning something they can use in the future.

The teacher learns that each assignment is designed to provide a challenge that although difficult is something that they can do and if they do it, they will earn a top grade.

The teacher learns that the foundation of teaching is to correct feedback problems and make changes to improve the structure and the process. Most importantly the teacher must create a classroom culture where the student believes and understands the teacher is on their side.

The teacher learns that it is necessary to iterate on the design of the assignments and most importantly to provide clear feedback concerning each change that is made.

Finally, the teacher learns that each class is a work in progress and that change is a constant element in the teaching process. The mindset of normalcy is a difficult challenge. A significant number of students have a “good enough” attitude. Resistance to change is the norm. Today with the power of the internet students do not hesitate to contact the teacher at any time concerning the class with a variety of requests and questions.

FINDINGS

Everything connects, in one way or another. The trick is seeing how things connect and then knowing how to use those connections. After reading over 3,000 papers some things started to connect.

There were five lessons that appeared. The first lesson was what separated the top students from the rest of the class or “how they told the story.” The top students wrote more. They learned how to use examples and details to tell the story. For those students the story design provided a “threshold experience,” much like the moment when I first realized I could swim, I could not only stay afloat but also I could paddle from one end of the pool to the other. They “got it,” each successful business has a story that needs to be told. In each class there were a small number of students, five percent or less that seemed to have perfect word pitch. Their papers were symmetrical, balanced and flowed from one question to the next.

The second lesson was that quantity time leads to quality time. History has shown that the most successful inventors produce and realize an amazing number of ideas. The strongest correlation for the quality of ideas was the quantity of ideas. The top students in each class produced 20% more words than the average student in the class. The word difference was mostly attributed to the use of the student adding more examples both personal and business related.

The third lesson and the first job of the teacher are to “get the students to act.” They need to create models that get the student thinking in multiple ways. In this experiment normalcy was the dominant thinking model. The word count and scores for approximately half of the students did not vary significantly from the first to the last paper.

The fourth lesson was the students in the top 40 percent of the class did increase their word count and personal examples in answering the student engagement questions. Some of these students shifted their perspective and wrote more about the lessons learned and what they found to be cloudy or unclear on not only the assignment but also the actions of their company.

The fifth and the most valuable lesson was the problem of satisficing. At the end of the experiment, I subjectively identified, three types of students: the bottom 10% of the class are reducers, the next 80% are satisfiers, and the top 10% are transformers.

CONCLUSION

In his 1957 book, *Models of Man*, Simon coined the term satisfice, a word that combines satisfy and suffice. By nature, people use the least effort to reach a solution that resolves the problem. They accept “good enough” and are unwilling or not capable of achieving an optimal solution. The purpose of using the Goldilocks’ formula was to identify the word count that showed the “just right” or what Simon would call the satisficing point. Each week after analyzing the papers I would email the class with the average word count and would make suggestions to try to suggest students adjust the content of the papers to improve their scores. The expectation was that students with a low word count would increase their input. A second expectation was that students who had a “satisficed” word count but a below average score would change the quality of their answers. But the reality was that the majority of the class did not make any significant change. They seemed to have this idea of normal in their head and normal is the enemy of the new. That challenge for the teacher is to understand that normal is not a reality but a construct, an idea made up of a set of conceptual elements.

The important idea is normalcy is simply a mindset inside a person’s head. Normal is a construct inside the head of the teacher and inside the head of the student. First, the teacher has to see and understand that he or she sees how to do something is a construct and that is can be changed. Once the teacher is free from this constraint then he or she is open to the question-based model that promotes integrated thinking as a method that could work. More research is needed but there is evidence that the use of the question-based method is transformational for a small fraction of the students who provide solutions that are clear, simple and elegant. The final challenge is to find the teacher who is willing to try a new method.

I learned from this experience that people resist change because they focus on what they have to give up, instead of what they have to gain. I also learned the value of trial and success. Now, I know what to change and to try again. It was trial and success.

“You never change things by fighting the existing reality. To change something, build a new model that makes the existing model obsolete.”

-Buckminster Fuller

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