

Practical Thinking Skills for Everyday Life

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Part 1: You can help children learn a fun, effective method for designing a product, strategy, or theory, which includes almost everything they do!

Design in Everyday Life

Design is a way to solve problems. In common language, a problem is bad, but... in design, a PROBLEM is any situation where you have an opportunity to make a difference by increasing the quality of life, or avoiding a decrease in quality.

In every area of life, PRODUCTIVE THINKING (GENERATE ideas, and EVALUATE ideas) is useful. These mutually supportive skills are integrated in the problem-solving methods used in a wide range of design fields — including engineering, architecture, medicine, mathematics, music, art, literature, philosophy, history, business, athletics, law, and science — where the goal is to design a **product, strategy, or theory**. Broadly defined, this includes almost everything in life.

A PRODUCT can be an object (like a bicycle or refrigerator), a repaired object (a car that works better), a work of art (like a painting, song, or story), a letter to a colleague, an inspirational talk for a community group, a paper to write, the food you're preparing for a potluck picnic,...

A STRATEGY can be for a wide variety of situations: educational, social, athletic, political, military, legal, financial, entrepreneurial, agricultural, or ecological. It can involve competition and/or cooperation. You can plan a strategy to win a soccer game, run a charity, grow crops to feed a nation, improve a personal or professional relationship, make a friend or be a friend, plan a party, prepare for an interview,...

Your personal decisions are a strategy for living, for achieving your goals in life. Similarly, business decisions are strategies for achieving business goals, and so on.

The Process of Design

1A. compare NOW-situations with potential FUTURE-situations, and RECOGNIZE that a problem exists (look for an opportunity to make a difference, to make things better), DECIDE to generate and evaluate ideas (and actions) that will help you make progress toward a solution.
--> DEFINE OVERALL OBJECTIVE (for the problem you want to solve, for what to design)

1B. **DEFINE GOALS** (for desired functions and performance) — What do you want?

THINK ABOUT OPTIONS and do **QUALITY-CHECKS** (How well does an option match goals?)

2A. **REMEMBER** (search for old ideas and observations) — You may not need to re-invent wheel.

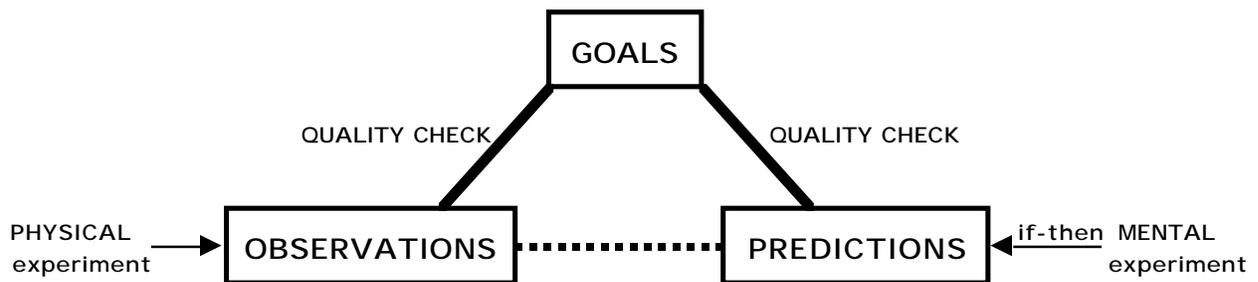
Search your own memory and (in books, websites, discussions,...) our collective memory.

2B. **IMAGINE** (to generate new ideas and predictions) — Can you improve an old idea?

2C. **TEST** new ideas (to generate new observations) — Find out what really happens.

3. **EVALUATE** using **QUALITY-CHECKS** (compare goals with observations or predictions), **DECIDE**.

4. an optional step is to **THEORIZE** (based on comparing observations with predictions)



The Logic of Science

The Scientific Method: Does it exist? No, but...

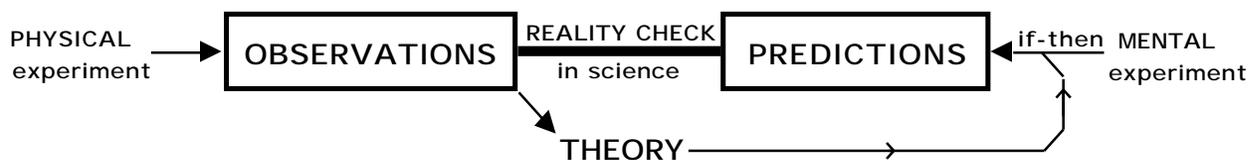
There is no single method, used in same way at all times, in all cultures, by all scientists in all areas of science. But some **SCIENTIFIC METHODS** are commonly used by scientists. These methods are flexible (structured improvisation of hockey skater) not rigid (figure skater's choreography).

Thinking is similar in science and daily life: by observing reality and using logic, you use **REALITY CHECKS** to determine whether "the way you think the world is" (according to your theory) corresponds to "the way the way the world really is."

PHYSICAL EXPERIMENTS (in situations that are controlled or uncontrolled) --> **OBSERVATIONS**

MENTAL EXPERIMENTS (ask "IF situation and theory, THEN __ will happen") --> **PREDICTIONS**

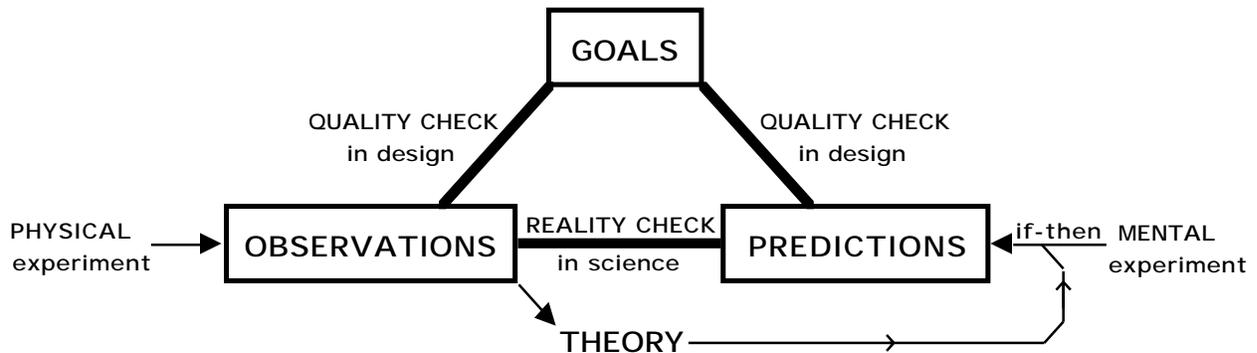
REALITY CHECK: Do predictions (based on theory) match observations (of reality)?



Theory Generation: Based on observations, generate a **THEORY** by recognizing a pattern, or by asking "What causes would produce the effects that we see?" (use effect-to-cause imaginative reasoning)

Part 2: This "design method" is related to scientific method, but is more practical and motivational because children can use it for most of the activities and decisions in their daily lives.

Design and Science



If we define DESIGN as the designing of products or strategies, and SCIENCE as the designing of theories, how are design and science related? What are the **similarities and differences**, in process and purpose?

Design Method: set QUALITY-GOALS for desired properties, do QUALITY CHECKS by comparing observations (of known properties) with goals (for desired properties) or by comparing predictions (of expected properties) with goals (for desired properties).

Scientific Method: 1) OBSERVATIONS are used to imaginatively generate a THEORY, 2) use theory (with if-then logic) to make PREDICTIONS so you can do REALITY CHECKS by comparing observations with predictions, to test whether "the way you think it is" (by assuming the theory is true) corresponds to "the way it really is."

Comparing Process: The methods in science and design are related, yet different. Can compare 3 (observations, goals, predictions) in 3 ways: 2 in design, 1 in science.

Comparing Purpose: What is the main objective?
In design, to develop product or strategy, to invent or improve humanly constructed.
In science, to develop theories, to understand universe that is divinely constructed.

Comparing Overlaps: Often, results of science can be applied in the designing of products or strategies, but this is not the main objective of science. During design it may be useful to improve a theory being used, but this is not main objective in design.

Comparing Cousins (science and engineering), main objectives (understand nature, improve technology) are different. But there are similarities, interactions, overlaps. Understanding (from science) often used in technology, and science uses technology (especially for making observations). In science or engineering, sometimes — as in chemistry and physics of automobile engines — we study divinely constructed nature in context of humanly constructed technology. And because we're distinguishing between science and design on the basis of process and purpose, rather than careers, a scientist sometimes does engineering, and an engineer sometimes does science.

An Educational Bridge: reality checks — used in both design and science — can serve as a bridge from design to science, making it easier to learn scientific method. During a design project, watch for an appropriate time to ask *the science question*: When predictions and observations are compared, do they match? (a reality check) This is an opportunity to ask questions or explain the logical foundation of science. Pacing is important. (you'll have time, can repeat many times) Most components of scientific method already used in design method, --> easier to learn sci method.

Design before Science: Because design "includes almost everything in life" it's easy to find design projects that are fun-and-useful --> motivation to think and learn. Repeat "design method" in many contexts --> disciplined thinking.

Use design to connect many areas: all are related to design, and to each other.

And use "reality checks" as an educational bridge from design to science.

As a concept, Scientific Method is more familiar than Design Method.

As an activity, design is more familiar, for what students have experienced in the past (so they can build on the foundation of what they already know) and also what they can imagine for the future (for motivation to learn skills and achieve their own goals for life). Therefore, it seems logical to teach design before science.

For more information about design and science, <http://www.asa3.org/ASA/education/think/intro.htm>

Explorations of Nature

Learn about nature by exploring: around your house and yard, on walks in your neighborhood, or in local parks. Be aware of what's happening in nature — blooming plants, interesting clouds, a beautiful sunset, awesome thunderstorm, mysterious fog, moon eclipse, meteor shower,... — and take advantage of natural opportunities. Wake up early, watch the world turn from dark to light, and visit a place where birds are singing. Take time to notice trees budding in spring, thriving in summer, turning colors in autumn, gleaming with snow in winter. During a trip, you can watch the constantly changing land shapes and plant life, you can look for places to stop and explore, and you may have a chance to escape the glow of city lights and see the Milky Way plus millions of other stars. Find ways to use all of your senses, to see, hear, touch, smell, and taste.

When two or more explore together, part of the fun is relational. To help a child develop a love for learning, you don't have to be an expert providing technical information. Just be there to share the experience and encourage, and occasionally call attention to interesting details. For a Christian, the experience is enhanced by our love for God, who created the world we joyfully explore.

We can also explore using second-hand experience, by letting others help us learn from what they have learned: in books,...

If explorations have stimulated curiosity and interest in a topic, a child will want to learn more about this topic. If watching clouds and thunderstorms leads to questions, learn more about weather in a book, film, or website. Maybe reading a small book about nutrition, about what we eat and how it helps our bodies work, will inspire a desire to learn more by reading more. If a child is fascinated by gadgets and asks "How does it work?", find out in "howstuffworks.com" or in a book.

How can you pick a topic? Usually, just be aware of what a child finds interesting. Occasionally, provide guidance by encouraging exploration of a topic that you think will be interesting or will be useful in life.

Motivation: Make it Fun and Useful

God made us for thinking, and it's exciting to use our minds skillfully.

Motivate children so they want to learn, so they think learning is FUN and USEFUL.

Why should they want to learn? Early in the process of education, it's best to focus on the intrinsic motivation of having fun now. Later, after a child has experienced the joys of learning-and-thinking in a variety of contexts, you can look for opportunities to explain how — in addition to being fun — learning can also be useful.

The ideal motivational situation is when a student thinks educational activities are immediately enjoyable and eventually will be practical, when activities are both fun and useful. Because utility, like beauty, is in the eye of the beholder, *personal goals* should be the focus of long-term motivation.

Will your education be personally useful in the future? When you have a forward-looking expectation that what you're learning now will improve your life, you have a reason to learn. When you view learning as an opportunity for self-improvement — so you can become the person God created you to be, so you can fulfill God's wonderful plan for your life — you'll want to learn. For long-term motivation, a good question to ask is, "What can I learn now that will help me in the future?"

As a teacher/parent, your question is "What can I help them learn now that will be useful for them in the future?" With your adult perspective, you see further down the road of life, and this lets you provide valuable guidance.

In all activities of learning and thinking, exploring the fascinating world of nature and ideas, you can help a child develop motivation, and maintain it for the long term, by enthusiastically sharing, consistently encouraging, and occasionally guiding.

Design Projects

Because design includes almost everything in life, you can find many ways to enjoy the excitement of design thinking, to experience the satisfaction of solving a problem and achieving a practical goal. What project should you work on? You can try to connect projects with mission-goals (long-term, short-term) and immediate situation: "What is the best use of my time right now?"

Many exciting "adventures in thinking" are possible in design. You can help a child find problems to solve and projects to pursue in all areas of life, in all school subjects and in everyday living. Daily decisions become a "designing of strategies for living" when you ask "what are your goals" and "based on your observations and predictions, which strategy-options will produce a closer match with your goals?" Review and practice the principles of design, you can stimulate creative, disciplined thinking.

Using reality checks as an educational bridge, learning design method can help a child learn scientific method.

Christian Education

Christian education is for the whole person, for every aspect of life: HOME SCHOOLING !!

Christian education in home, for every family, whether public, private, or home school.

Combine reality-checks with faith. Build and maintain a Christian worldview — a view of the world, used for living in the world — based on the Bible, which tells us that REALITY includes what we see and what we don't see.

Main goal is learning how to live by faith, with a trust in God serving as the foundation for all thoughts and actions of daily living. (a "deep desire of the heart" for each of us)

Our main purpose in life is bringing glory to God by the way we live, by joyfully doing what He commands: "Love the Lord your God with all your heart, with all your soul, and with all your mind. ... Love your neighbor as you love yourself." (Matthew 22:37,39)

Our primary relationship, with God, is a foundation for our secondary relationships, with people. In everything we do, we should be a good witness for Christ in our thoughts and actions: "Who is wise and understanding among you? Let him show it by his good life, by deeds done in the humility that comes from wisdom. (James 3:13)"

How? "Offer yourselves as a living sacrifice to God, dedicated to his service and pleasing to him. This is the true worship that you should offer." How can you please God? "Do not conform yourselves to the standards of this world, but let God transform you inwardly by a complete change of your mind. Then you will be able to know the will of God — what is good and is pleasing to him and is perfect." You are to "let God transform you" because God wants to be the spiritual source for your transformation and empowering. When you are willing to let God transform you, beginning with prayer, "your lives will be filled with the truly good qualities which only Jesus Christ can produce, for the glory and praise of God."