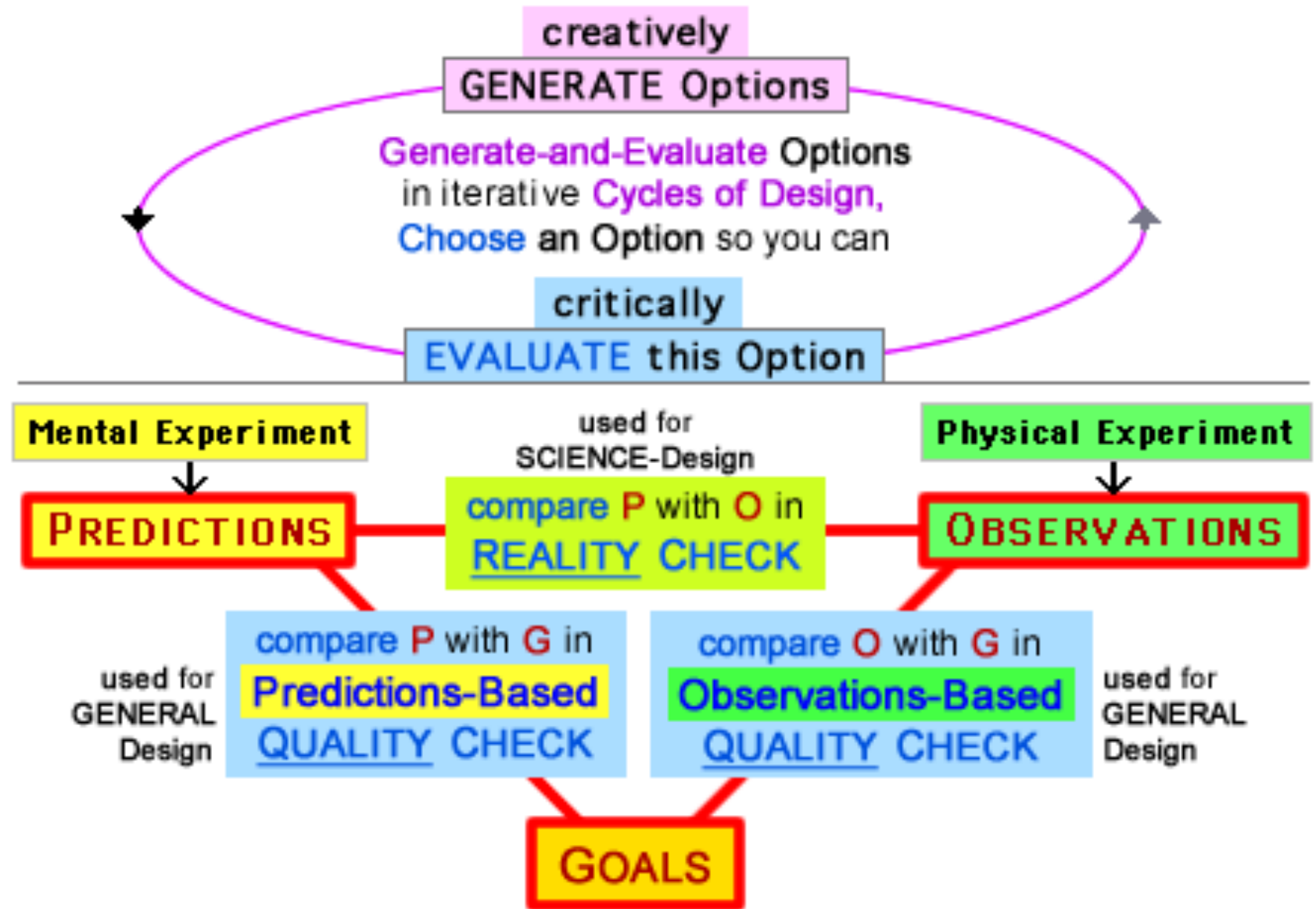


This is the
central core of
my model for
Design Process.

Mystery Question:
Why does the
Cycle have
an arrow on
its right side,
pointing
from Evaluate
to Generate?



Use Metacognitive Thinking Strategies to improve Learning and Problem Solving

a presentation for OAGC on October 13, 2025,
by **Craig Rusbult** – an enthusiastic educator
with a PhD in C&I from U of Wisconsin,
who wants to find co-enthusiasts.

50-word summary in conference program:

Give students educationally useful experiences, and
use metacognitive thinking strategies (self-questioning, reflection, SRL,
my problem-solving model,...) to help them learn more from their experiences,
improve their knowledge and skills. Use the wide scope of “problem solving” to
build motivational transfer-bridges (from school into life)
throughout the curriculum.

a quick “big picture overview” of topic-areas in my talk:

- my model for **Design Process** (i.e. for **Problem-Solving Process**).
- why Design Process has two wide scopes (for **Activities & Process**); how these wide scopes **are educationally beneficial** by helping us **build bridges** (from school into Life) **that will motivate students**; why the wide scopes **promote transfers Across Areas & Thru Time**.
- **metacognition** (**what** it is, **why** it's useful, **how** Design Process can help students develop-and-use **metacognitive Thinking Strategies**).
- questions, re: Design Process from **POV's** of students & teachers.

For each topic-area, my website ([Education for Problem Solving](#)) can help you develop a better understanding (more thorough and accurate) than you see in the quick summaries of this PowerPoint.

I'll adjust the beginning of this topic-sequence by first explaining

- why Design Process has a wide scope for **Activities & Process**;

followed by describing

- my model for **Design Process** (for **Problem-Solving Process**),

and then explaining

- why Design Process has a wide scope for **Activities & Process**;

before continuing the why-how-why of **the two wide scopes**, with
how these wide scopes **are educationally beneficial**.

Then the topic-sequence will be what you see in the previous slide.

Here are some ideas to help you use this PowerPoint:
**some slides are OK to “read” (or skim) during talk, but
some slides have TMI, are useful read BEFORE or AFTER the talk.**

All of the links are underlined and have **GOLD TEXT.**

a wide scope for Problem-Solving Activities:
broad definitions → wide scope for Activities.

PROBLEM can (and should?) be defined as...
an opportunity to **make something better.**
(better in **any way**, in **any area of life**)

PROBLEM SOLVING therefore is defined as...
whenever you do **make something better.**

Partly due to these definitions,
PS-Objectives (→ PS-Activities)
include **almost everything we do.**

It can be useful to think about
your **Problem-Solving Objective**
(it's **what you want to make better**)
in categories with "kinds of things" — for example, as a
product - activity - relationship - strategy
in a Problem-Solving Project for **General Design**
or a
theory
in a Problem-Solving Project for **Science-Design**
(with overlaps, often it's an **activity** and **relationship** and...)

what? This definition differs from a common perception that a **problem** always begins with “a bad situation” because in my definition your feelings about the current now-situation could be anywhere within a wide range:

dismal

lukewarm

wonderful

awesome

If you produce “**a move toward a better place**” anywhere in this range, whether from dismal to lukewarm, or wonderful to awesomely spectacular, this is **problem solving** because you have made the situation become better.

In the same way, I broadly define the **designing** that is **problem solving**.

why? People solve problems because we want to make things better. Or we want to avoid letting things get worse. We can “make things better” by *increasing quality* or *maintaining quality*, by *promoting beneficial change* or *resisting harmful change*.

two ways to learn: A student can learn **from their discoveries** and **from a teacher's explanations**. / My "**Discovery Page**" describes...

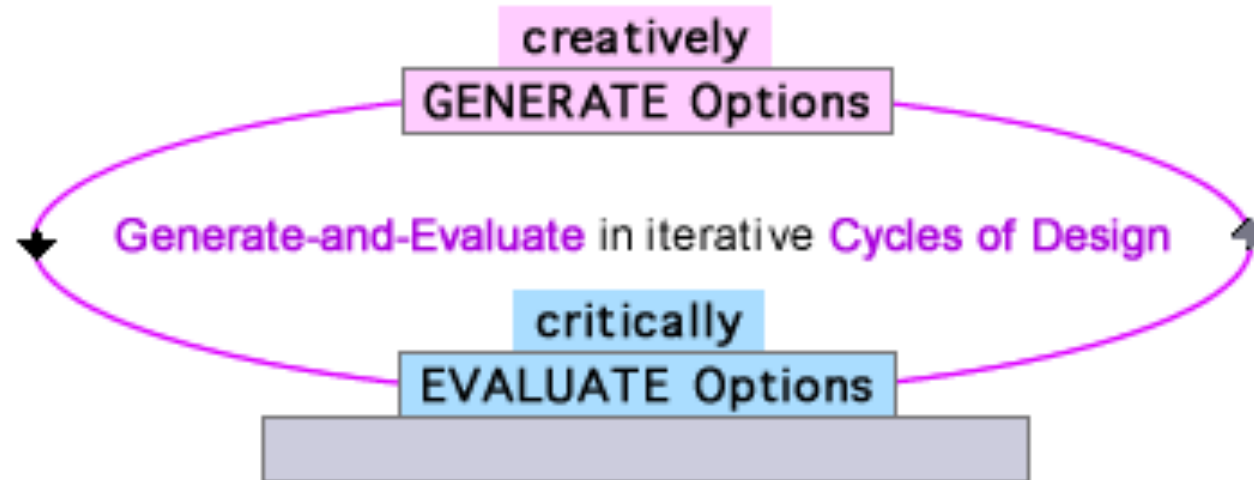
your learning by discovering: When you explore three diagrams in my model for **Design Process** (for **Problem-Solving Process**), you will discover. You will understand the **Problem-Solving Actions** that people use when we are **designing solutions for problems**. These productive Actions are logically organized so you'll understand more easily, and will improve your problem-solving skills more effectively.

your process of exploring: In each diagram, observe (and think about) the words & colors and spatial relationships, always asking "what does this mean? what action is being described?"

your process of recognizing: While you're exploring the diagrams, think about the actions you use (naturally & intuitively) while you are solving problems, and you will recognize that **Your Own Actions are the Problem-Solving Actions** you see in diagrams for Design Process. In this way, your **Discovery Learning** becomes **Recognition Learning**.

Diagram 1 — Define and Solve

Learn so you understand more accurately-and-thoroughly
before-during-after you
Define your Objective and Define your GOALS for a Solution,



continue to **Evaluate Options** one at a time — by
Choosing an Option & **Evaluating This Option** — until
you **Choose an Option** to be your **Problem-Solution**;
then **Actualize This Option** with Actions, converting
it from a Potential Solution into an **Actual Solution**.

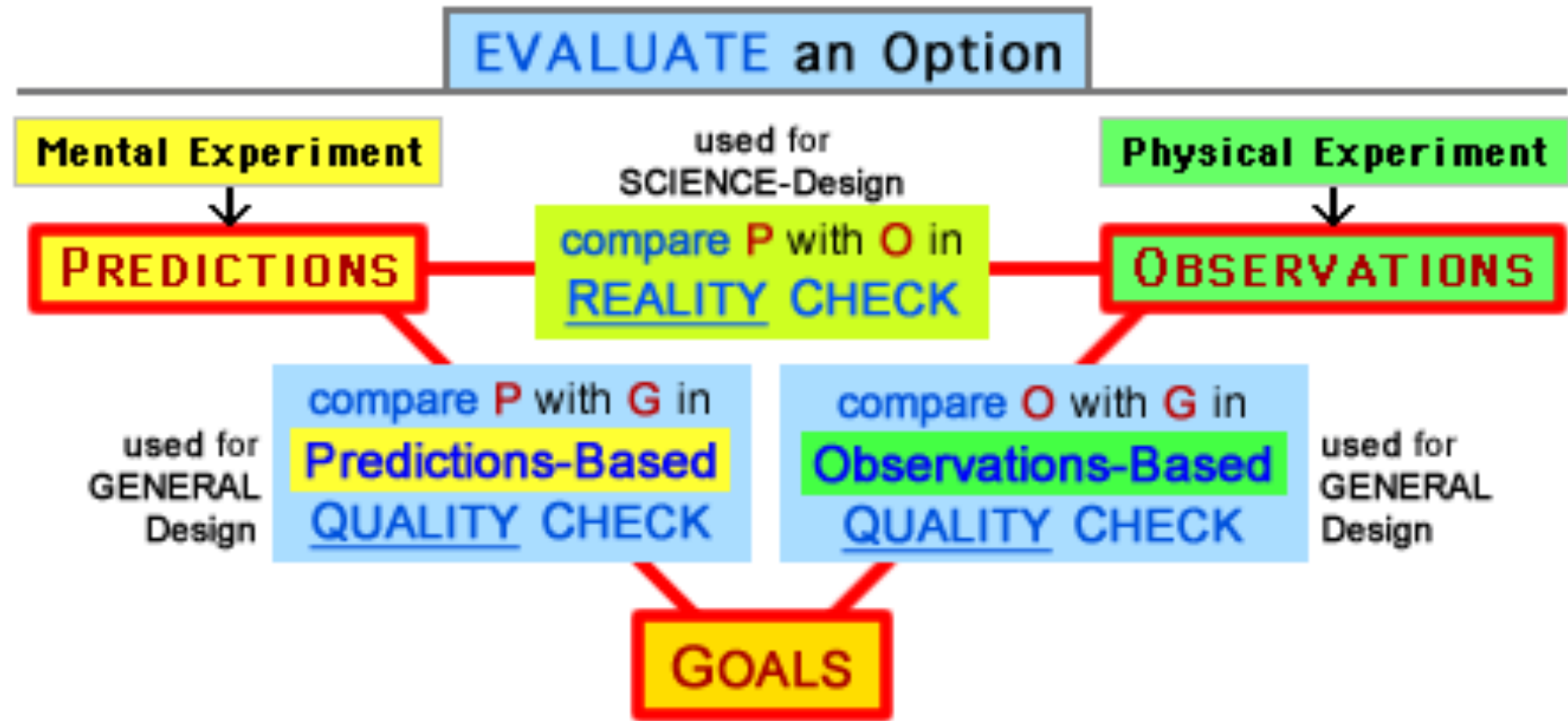
(or delay work on the Problem-Project, or abandon it)

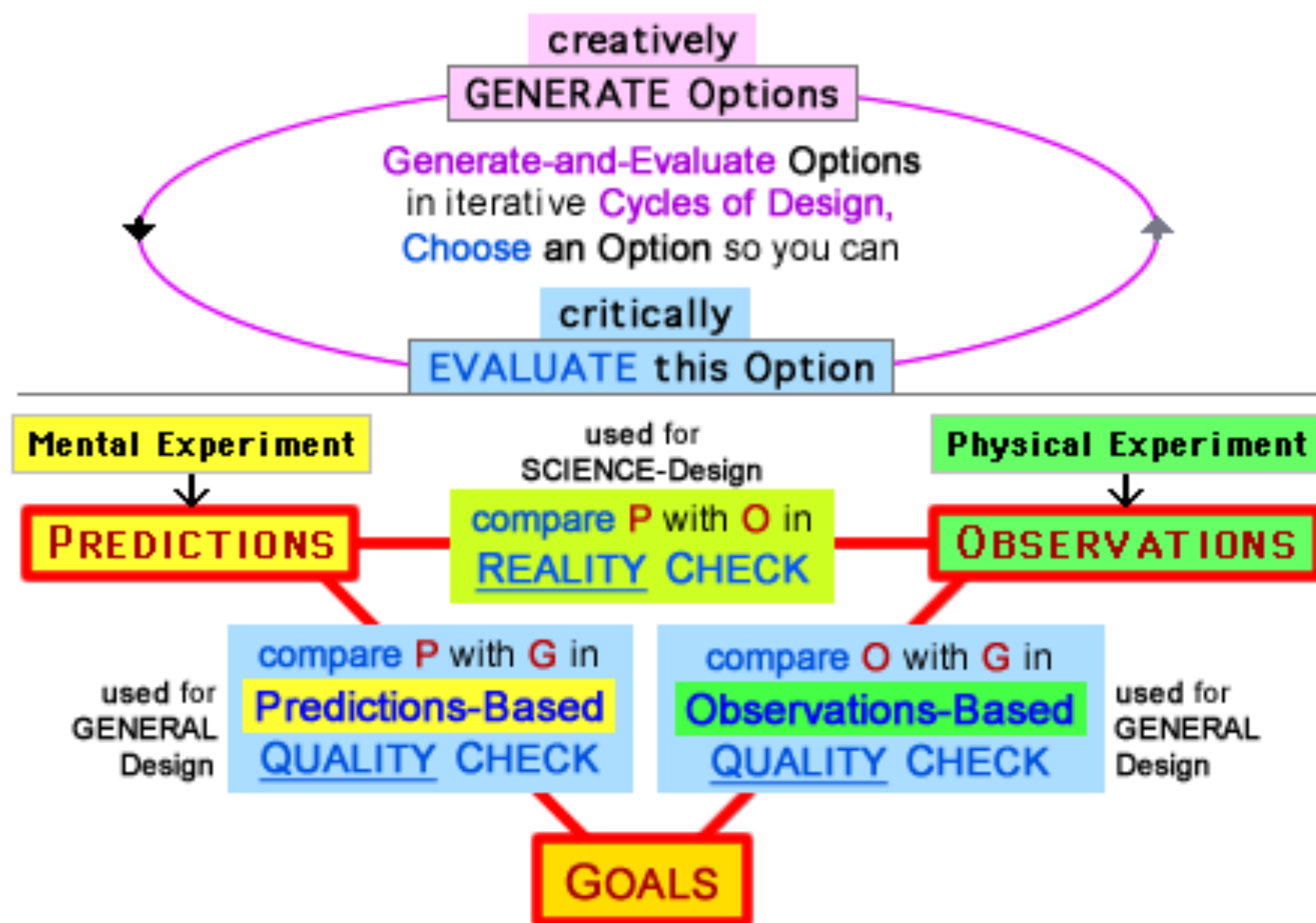
Define

Solve

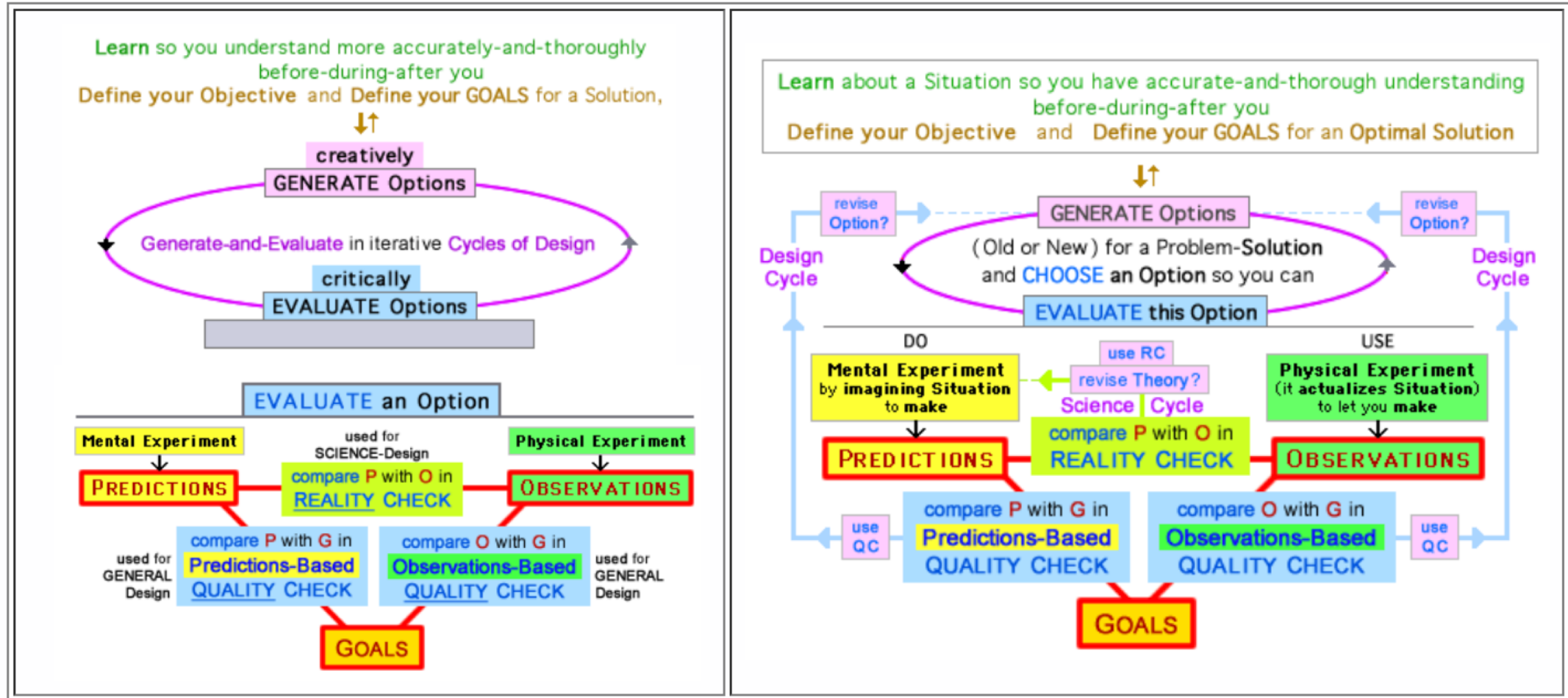
Solve

Diagram 2 — 3 Elements in 3 Comparisons





Above, my **new favorite diagram** (not Diagram 2) shows how “**1+2 ≈ 3**” and it might replace **the left side of this table** (made in July) that shows how **2** fills “the gray box” in **1**, and how **3** answers the **Mystery Question**.



Learn about a Situation so you have accurate-and-thorough understanding
before-during-after you
Define your Objective and Define your GOALS for an Optimal Solution

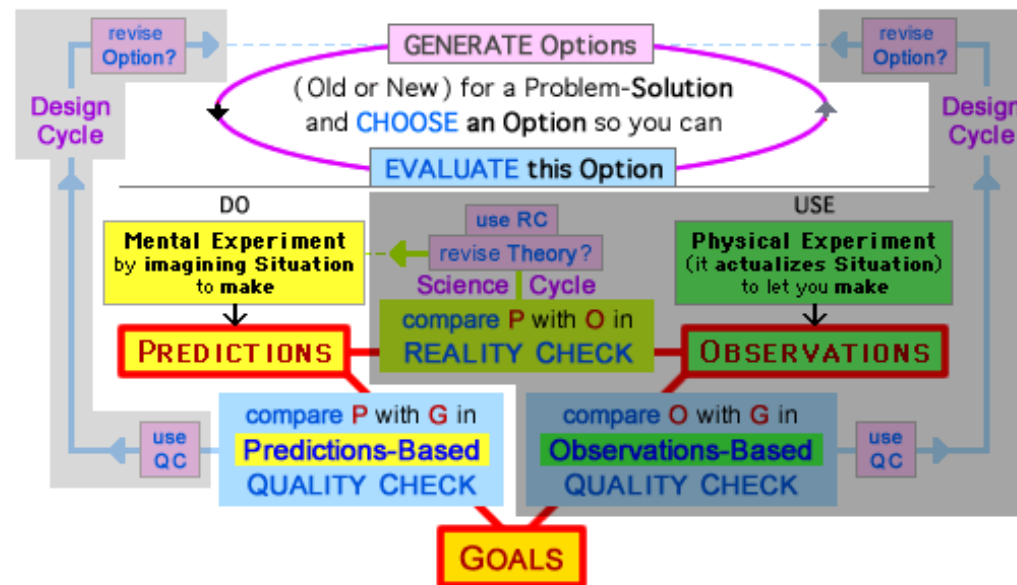


the Mystery Answer: a **Quality Check** asks **The Design Question** (“**how high is the Quality?**” with Quality defined by your GOALS) that also is asking “**how close is the match?**” when comparing This Option's **Actual Properties** (Predicted or Observed) with the **Desired Properties** that you defined by your GOALS.

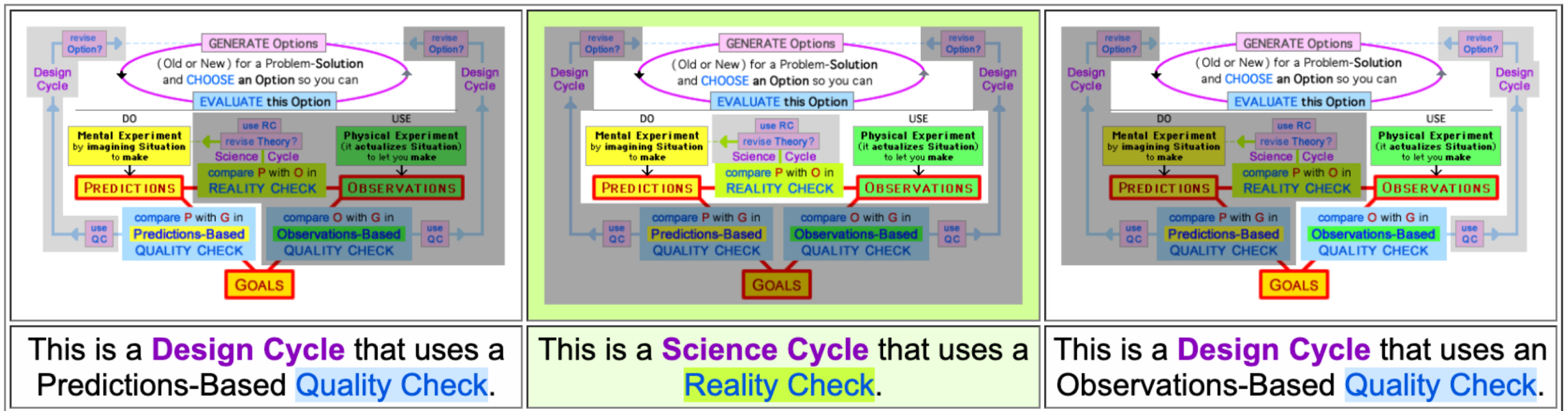
a **Reality Check** asks **The Science Question** (“**how close is the match?**” when comparing **Predictions** with **Observations**); the RC-Answer is an important factor – **ideally should it be the only factor?** – in determining if your **theory** about “how the world works” (thus “what will happen”) **is true** (meaning that it **corresponds with reality!**)

Below, in the unshaded and lightly-shaded regions you see the most common **Sequence of Problem-Solving Actions**, in the downward flow of Action-verbs — Generate, **Choose, Evaluate** (DO by imagining to make, **compare**), use, revise, Generate — that completes a **Cycle of Design**.

It's a common **Action-Sequence** because in each pair of Actions, one Action leads to the next Action, when you do one Action and then ask “what should I do next?” and decide “**I can make progress** (in Solving the Problem) **if I use the results of this Action** to do my next Action.”



Below, this **Action Sequence** (a **Predictions-Based Quality Check**) is on the left side; on the right is an **Observations-Based Quality Check**, and in the center is a **Reality Check**.



You don't have to “learn” these three Action-Sequences (and others) because you already are using them to coordinate your PS-Process; so instead of **learning them**, you just have to **recognize them**.

an important IOU + LINKS

During the weekend of October 10-12, this PowerPoint will continue improving because I'll be developing-and-revising it, with a few minor changes above and **many major changes below.**

You can see **the current updated version** by **clicking this link.** And an **OAGC Page** will help you learn more time-efficiently in my website about **Education for Problem Solving.**

a reminder:
to see
the updated version
of this PowerPoint
CLICK HERE.

regarding **Activities** and **Process**, I claim that

A) our **PS-ACTIVITIES** include **almost all we do**,

B) our **PS-PROCESS** is similar for **almost all we do**.
is similar but is not identical

because **you can choose** different Action-Sequences
to metacognitively coordinate your Design Process.

Combining these two claims → my claim that
people use a similar Process of Problem Solving
for **almost everything we do** in our **PS-Activities**.

HOW? using Design Process leads to wide scopes for...

A) Problem-Solving OBJECTIVES (and thus for ACTIVITIES)

B) Problem-Solving PROCESS.

PLUS – How People Learn: Brain, Mind, Experience, and School

How People Learn (from National Research Council) says **transfer** is "the ultimate goal of learning" so it's "a major goal of schooling," and recommend (based on research about learning) that **to increase transfer, we should:**

A) **teach knowledge in multiple contexts;**

this is allowed by the wide scope of PS-Objectives;

B) **teach knowledge in a form that's easy to generalize;**

Design Process does this by using a similar PS-Process throughout the wide range of **PS-Objectives**.

a summary of the previous slide:

How People Learn

says that – to increase transfers – we should
"teach knowledge in a form that's easy to generalize"

and

"easy to generalize" does occur with my model
for Design PROCESS,
for Problem-Solving PROCESS.

Why should you accept my bold claims?

Is there "**PROOF** beyond a reasonable doubt"? – **NO**.

Are there **logical REASONS** for "a good way to bet"? – **YES**.

We have **logical reasons** to predict that **using Design Process** is a good way to bet, can be useful in educational projects, is worth developing with investments of time, money,...

Personal Education: Area-Transfers & Time-Transfers:

When students decide that they want to pursue their own **Personal Education**, they're **motivated** by imagining **TRANSFERS Across Areas** (from **School** into **Life**) and **TRANSFERS Through Time** (from **Present** into **Future**).

There are logical reasons (e.g. earlier I described the **A**-and-**B** of **ACTIVITIES**-and-**PROCESS** with wide scopes) to expect **transfers Across Areas**.

By contrast, expecting "**transfers**" **Thru Time** depends more on the thinking of a student: Are they imagining the ways that **their present School-Learning** will improve the quality of **their future Life-Living**?

Performing Objective = want best performing **NOW**.

Learning Objective = want best learning **NOW**
so you can improve best performing **LATER**.

Past

PRESENT

Future

Learning
NOW



Performing
LATER

examples for basketball team: you have

LEARNING Objective in early-season practice,
PERFORMING Objective in late-season tournament game.

Student **expectations**: When students **think** they will get
TRANSFERS of Knowledge-and-Skills
ACROSS AREAS and **THROUGH TIME**,
this can produce **TRANSITIONS** in **Attitudes**:

Past

PRESENT → FUTURE
SCHOOL → **my LIFE**



MOTIVATIONS:

If I improve **PRESENT** PS-Skills in SCHOOL,
these will be **FUTURE** PS-Skills in LIFE.

And student expectations for Transfers
produce another Transition in **ATTITUDE**,

Past
LIFE



PRESENT
SCHOOL

Future



CONFIDENCE

I've done PS-Process BEFORE in LIFE,
so I can do it NOW in SCHOOL.

iou:

**The remaining slides will be revised
between now and Monday.**

Maya Angelou describes Performing and Learning:

"Do the best you can until you know better.

Then when you know better, do better."

Or, with [my comments],

Do the best you can [with high Present Performing]

until you know better.

Then [later] **when you know better** [due to Present Learning],

do better [with high Future Performing].

Using an **Objective-to-Perform** usually is best short-term, but long-term it's best to ALSO sometimes use an **Objective-to-Learn**.

HOW can Educational Bridges **increase** Transfers Across Areas?

A) By using **broad definitions** for **Problems** & **Problem Solving**,
Problem-Solving OBJECTIVES **include almost everything we do.**

And in a second wide scope,

B) my model for **Design Process** shows how we use a similar
Problem-Solving PROCESS **for almost everything we do.**

Terms: In my model,
Problem-Solving Process
is Design Process

Personal Education is Problem-Solving Education:

We can ask students to...

think about their goals for life (involving themselves + others)* and **develop a proactive problem-solving approach** for their education, asking "how can I **solve a problem** – by **making my education better** to **make my life better** – to help me achieve my goals for life?"

(* and help others have better lives, with win-win goals & results?)

Personal Education is proactive problem solving.

A student tries to **make things better**
because they believe that...

improving **School-Life** improves **their Whole Life**
because **better Education** produces a **better Life**;
making **Their Education** better will make **Their Life** better.

Why should you accept these claims?

- A) A wide scope for Problem-Solving OBJECTIVES is easy to show — IF you think **my broad definitions** are reasonable — and the wide scope of PS-**Objectives** lets us design PS-**Activities** that are **FUN** and (as perceived by students) are **USEFUL**.
- B) Later I'll show how my model for **Design Process** – for the Problem-Solving PROCESS that people use for most things we do in life — is an accurate description of how we actually use creative-and-critical thinking while we solve problems. If students believe that PS-Process (used by them in School) will be **Personally Useful** (in Life), they will be motivated to invest in their own **Personal Education**.

I want to work cooperatively with other educators
to develop our ideas for improving education,
by creatively-and-synergistically combining
MY experiences-understandings-skills
with
YOUR experiences-understandings-skills.

This talk will be mainly about education for K-12,
but most ideas also can be used for college education.

If you find my ideas interesting — even if (maybe especially if)
you're thinking "**yes, but...**" because you **agree partially** (yes)
but **not totally** — of course that's ok, and it could help both
of us learn if we discuss your reasons for **yes** and also for **but**.

Originally, this slide said...

**All of the remaining slides WERE about
principles and strategies you already know
(and during the weekend many will disappear)**

or

**they're ideas that aren't yet developed-and-revised
into a form that I later will use in the PowerPoint,
so you probably will want to stop reading here.**

**But I didn't want viewers to feel overwhelmed
by a huge number of slides, so I moved them
into a new file for OAGC Cuts.**