ENCOURAGING PRODUCTIVE STRUGGLE

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• Video games as learning environment
• Video game designers challenge
  • teach you how to play
  • engage the player in just a few minutes
• Social aspects are becoming more prominent now that the technology allows it
• Not rescued but supported (teachers have a hard time find the line between the two. Our role is to alleviate struggle)
• The person that does the work does the learning
21ST CENTURY SKILLS

- Collaboration
- Creativity
- Critical Thinking
- Problem Solving
1. Broken into tiny bits
2. Smooth out obstacles
3. Focus on answers
Culture: Expect everything to be explained

Mindset: Give up too easily

Application: Struggle to apply knowledge
TIME TO DO SOME PROBLEMS!
\[ 4 \frac{2}{5} - 2 \frac{2}{3} \]
BROKEN CALCULATOR

• Your calculator can only add 3s and 7s.
• Questions?
ANTIDOTE IS PROBLEM SOLVING
ACHIEVING THE VISION

• Create a culture of engagement & perseverance
• Spark curiosity
• Change mindsets
THE ONE ACTIVITY WHERE STUDENTS ARE ENGAGED & PERSEVERE...
VIDEO GAMES

Minecraft

Angry Birds

Tetris
ALSO THE ONE PLACE WHERE KIDS NEVER ASK...

"WHEN AM I EVER GOING TO USE THIS?"
PLAYING A GAME IS THE VOLUNTARY ATTEMPT TO OVERCOME UNNECESSARY OBSTACLES

BERNARD SUITS - PHILOSOPHER
AGENCY
PROGRESSIVE CHALLENGE
NORMALIZE FAILURE

It’s only FUN to “fail” if the game seems FAIR and you have HOPE of SUCCESS
DESCRIPTIVE FEEDBACK

• Help students answer:
  • Where am I now?
  • What went well?
  • Where am I going?
  • How can I improve?
  • What did I learn from this attempt?
DON’T ELECTROCUTE THE DEER
FINDING THE LINE

- Teachers tend to want to alleviate struggle
- Let me show you how...
- Let’s do some examples...
- I’ll do a “pre-lesson” first
- The goal is not to support not rescue
“Video games don’t judge me.”

– JADEN SHAH, PHILOSOPHER
CULTURE OF ENGAGEMENT

- Give students some choice
- Start simple then increase the demand
- Normalize failure (like Tetris)
- Deliver descriptive feedback
- Stop giving the answers
LET’S APPLY WHAT WE’VE LEARNED
STAIRCASE NUMBERS

2 + 3 + 4 = 9
4 + 5 = 9
3 + 4 + 5 + 6 + 7 = 25
ACHIEVING THE VISION

• Create a culture of engagement and perseverance

• Spark curiosity

• Change mindsets
“The biggest problem in education is the giving of answers to questions that have not yet been asked.”

– DR. ARTHUR COMBS
QUESTIONS ASKED BY AGE

Frequency per Day vs. Age

Mostly “Why?”

Rarely “Why?”

What a Great Idea! Chic Thompson
SPARK CURIOSITY

Create gap between what’s known and unknown

1. Let students ask questions
2. Show part of a pattern
3. Turn problems into puzzles
4. Ask “would you rather?”
The figure below is composed of 6 identical squares. The area of the entire figure is 150 cm\(^2\). What is the perimeter of the figure?
NOTICE ANYTHING? QUESTIONS?
WHAT COMES NEXT?

- $1 = 1$
- $1 + 3 = 4$
- $1 + 3 + 5 = 9$
- $1 + 3 + 5 + 7 = 16$
- $1 + 3 + 5 + 7 + 9 = ???
Compute the Area

The area is 12. What are some possible dimensions?
How much is a pound of dimes worth?
How much is a pound of quarters worth?
Would you rather have a pound of quarters or a pound of dimes?

1 dime is 2.268 grams 1 qtr is 0.0125 pounds
TWO MINDSETS

• Tell kids about mindset and the plasticity of the brain

• Praise effort over outcomes

• Use descriptive feedback

• Add “...yet” to “I can’t do x”
Why are my arms and legs flailing apart?!
“I have no special talents. I am just passionately curious.”

– ALBERT EINSTEIN
SUMMARY

• Take time to spark curiosity
• Give students some control
• Start simple!
• Give descriptive feedback
• Stop giving answers