Assignments that Meet the Needs of Exceptional Students without Disadvantaging the Average

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Introduction

Beginning students have dramatically different:

- Backgrounds
- Abilities / Strengths / Fears
- Interests / Talents
- Future directions

Can We Reach Them All?
A Solution: One Assignment with Variations

- “Base Assignment” is same for all
- Requirements can allow for variation and choice.
Variation 1: Levels of Completion

- (stages) can be described in the assignment specifications.
- Decide base (acceptable) requirements
  - What is “good enough”
- The rest are ‘embellishments’
A-B-C Requirements (Staged Solutions)

- Allows for more complex & interesting problems
- Clearly set out requirements
- Gives “choice” back to students
- ‘C’-level is within the range of all
- Can supply portions of code, and invite students to replace it
- Provides a means of describing a minimal acceptable solution
Student Reactions:

- Few complaints about marking
- Some will choose to complete ‘C’ requirements sometimes, and “go for the ‘A’” other times
- Students complete the ‘C’-level assignment and often opt to try for the ‘B’
- Students often end up working harder – to get the extra credit
Example:

![Frogger Game](image)

**FROGGER**

1-UP: 04320  HI-SCORE: 16150

TIME: 40
Example: Frogger

- **C Requirements** The minimal passable solution will have only a single Frog that moves correctly on the screen, 2 rows of Vehicles moving in opposite directions and one Home at the top. This solution is worth a maximum mark of C+

- **B Requirements** The midrange solution will have 3 Homes, 5 rows of Vehicles, and a working Frog who can move [jumping is bonus] and ONE OF: two kinds of Critter, ---OR--- a Boulevard to rest on (with NO time limit), This solution is worth a maximum mark of B+

NOTE: having the frog ride river creatures properly (and not "slide" off) is BONUS and not part of the base requirements.

- **A Requirements** The best solution will have 5 Homes, 5 rows of Vehicles, one Frog, AND 5 rows of Critters all working correctly. It is worth up to an A The boulevard will have a time limit, [BONUS: and the turtles must sometimes dive.]

- The "full-function" Frogger is Bonus. It includes the girl Frog; Alligators whose mouths open, and snakes on logs and on the boulevard
Variation 2: Bonus Points

- Enhancements for all
- **EXTRA** to basic requirements
- Limited effect on grade
- Provides mechanism for rewarding *any* valid embellishments
- Even though a maximum of points used to affect final grade, some earn as many as they can

*It becomes like a game for some: to see how many points they can earn* (prime# asst)
Bonus Points: Frogger

1. [up to 6 points] Make a girl frog.
2. [up to 6 points] Make the alligator's mouth open.
3. [up to 10 points] Include the snakes.
4. [up to 10 points] Multiple (5) frogs per game. [homes can be occupied by only one frog]
5. [2-3 points] Detect "Game Over": when Frog dead; or when Frog gets across.
7. [2-5 points, per level] Allow different levels of difficulty (different #'s of things, different ranges, etc.)
8. [2 points] Set up "key bindings" so player can use the arrow keys, etc.
9. [4-?] points] Make it Interrupt Driven
Challenges

- Enhancements for the brightest
- Some are post-grad level
- Ideas for students
- Shows where the current project could lead
Challenge Points: Frogger

1. [4-? points] Add sound.
2. [4-? points] Create a full GUI
3. [5-? points] Do it in colour
4. [5-? points] 3-D
Assignment Specifications

'A' Solution

'B' Solution

'C' Solution

Bonus

Challenge
Conclusions

- Gives both instructor and student greater flexibility
- Helps to clarify goals of assignment for all (instructor; student; marker)
Examples

• **Solitaire:**
  - Calculation
  - Canfield
  - Four Seasons
  - Double or Quits

• **Games:**
  - Game of Life
  - Minesweeper
  - Battleship
  - Asteroids!
  - Space Invaders
  - Centipede
  - Frogger

• **Parsers:**
  - Tiny Basic Interpreter
  - Polish Postfix Converter
  - Arithmetic Expression Parser
  - Wee-English – Latin Translator

• **Encryption:**
  - One-Time Pad
  - Caesar Cypher
  - Cyclic Pad
  - Byte Reversal

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Thank You.