Motivation and Incentives in Classroom Assessment

The Role of Affect in Documenting and Measuring Student Ability
Think about…

- How were different motivation tools and techniques incorporated into classroom assessments you completed as a student?
- What were the incentives for studying, completing, and doing well on the assessments?
- Anything unique or unusual?
Students and Tasks

From *Flow: The Psychology of Optimal Experience* by Mihaly Csikszentmihalyi (page 74)
Within the context of computer science

- Interest in computer programming is waning in USA
- Enrollment in UG comp sci dropped 70% between 2000 and 2005
- Comp Sci job out-scourcing – symptom or part of the problem?

- Is this a motivation problem?
  - Intrinsic interest of middle grades students in computer programming?
  - Is the over attention to skills undermining opportunities for authentic learning?
  - Gender differences?
What if…

- … game design was the goal, and programming was the underlying skill objective to reach that goal?

- … the skill requirements were heavily scaffolded initially, and then student interests in design motivated learning of skills that “I need to know”?

- … the authentic problem was the goal, and the skills (grammar, procedural knowledge, vocabulary) were introduced as needed?

- … student success in completing the authentic problem defined the sequence of instruction?
Flow and game design

The chart illustrates the relationship between design challenges and design skills on a continuum. The vertical axis represents design challenges, ranging from low to high, while the horizontal axis represents design skills, ranging from low to high. The chart shows that as design skills increase, moving from low to high, the design challenges also increase from low to high, with a peak at the optimal flow between anxiety and boredom. Examples of games are shown, including The Sims, SimCity, Pacman, and Frogger, indicating different levels of design challenges and skills.
Figure 2: a Traffic Simulation in AgentCubes: (1) the gallery where all the agents and their shapes are defined; (2) the world where the simulation or game unfolds; (3) an Inflatable Icons editor for creating 3D objects from 2D images; (4) rule-based agent behavior defined in Visual AgenTalk 3D, using conditions (5) and actions (6).
10 hours of instruction

- Designed a Frogger game from scratch
- Completed both 2D and 3D views (new)
- Opportunities for personal design and creativity

So what did they learn about programming and design?
10 hours of instruction

- Designed a Frogger game from scratch
- Completed both 2D and 3D views (new)
- Opportunities for personal design and creativity

So what did they learn about programming and design?
Assessment Problem

- Pre-test vs. post test?
  - But this is the first time they’ve seen this programming environment

- Desired skills from the state?
  - There are no assessments for computer science

- Appropriate measures of learning?
  - Design is a unique context

- Again, what have they really learned?

- What is an authentic situation for computer programmers?
Troubleshooting

- Car movement bug
- Car generation bug
- 2D navigation bug
- 3D navigation bug
- Turtle generation bug
if once-every 0.1
%–chance 30

then
new ← CAR2

if once-every 0.5
%–chance 20

then
new ← CAR2

see ←
Troubleshooting

- Car movement bug
- Car generation bug
- 2D navigation bug
- 3D navigation bug
- Turtle generation bug
<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Cars not moving</th>
<th>Cars piling up</th>
<th>Frog movement (2D)</th>
<th>Frog movement (3D)</th>
<th>Turtle generation</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Students</td>
<td>24</td>
<td>67%</td>
<td>88%</td>
<td>79%</td>
<td>75%</td>
<td>42%</td>
</tr>
<tr>
<td>Schools</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boulder</td>
<td>14</td>
<td>71%</td>
<td>93%</td>
<td>64%</td>
<td>64%</td>
<td>50%</td>
</tr>
<tr>
<td>Aurora</td>
<td>10</td>
<td>60%</td>
<td>80%</td>
<td>100%</td>
<td>90%</td>
<td>30%</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>16</td>
<td>63%</td>
<td>81%</td>
<td>88%</td>
<td>88%</td>
<td>50%</td>
</tr>
<tr>
<td>Female</td>
<td>8</td>
<td>75%</td>
<td>100%</td>
<td>63%</td>
<td>50%</td>
<td>25%</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>13</td>
<td>69%</td>
<td>92%</td>
<td>69%</td>
<td>62%</td>
<td>46%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>5</td>
<td>60%</td>
<td>80%</td>
<td>100%</td>
<td>100%</td>
<td>20%</td>
</tr>
<tr>
<td>Afr-Am</td>
<td>3</td>
<td>67%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>33%</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>67%</td>
<td>67%</td>
<td>67%</td>
<td>67%</td>
<td>67%</td>
</tr>
</tbody>
</table>