I. Flow
Flow theory describes the optimal human experience; during such experiences a person is performing to the utmost of their ability. Flow experiences occur when a person’s attention is focused on a particular task, and is not distracted by influences outside of the activity at hand. Due to the powerful nature of flow experiences in the areas of motivation and learning, it is important to investigate connections between educational practices, like the use of Maple T.A.

Conditions of Flow
Research has shown that flow experiences occur under a specific set of conditions. These conditions include the balance of a person’s ability to act and the available opportunities for action.

- Challenges
- Skills

When the challenge of an activity and the participants skills are both high, the possibility of experiencing flow is increased.

In addition to this balance between Challenge and Skill, all activities which produce flow are characterized by some or all of the following properties:

<table>
<thead>
<tr>
<th>Activity Dependent Properties</th>
<th>Activity and Participant Dependent Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Possibility of completion</td>
<td>Ability to concentrate</td>
</tr>
<tr>
<td>Clear goals</td>
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<tr>
<td>Immediate feedback</td>
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<tr>
<td>Sense of control over personal action</td>
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II. Maple T.A.
Maple T.A. is a web-based system for creating homework assignments. There are two main properties of Maple T.A. assignments which differ from traditional paper and pencil assignments.

- Immediate External Feedback- Upon completing a Maple T.A. assignment students are given immediate access to the score and the correct responses for the assignment
- Consistent Level of Challenge- Teachers can choose to allow students to complete Maple T.A. assignments multiple times. Each subsequent assignment is the same level of difficulty as the preceding assignment.

These properties make Maple T.A. special compared to previously used homework methods. Maple T.A. seems to contain all of the activity dependent characteristics of a flow activity, more so than traditional paper and pencil forms of mathematics homework. This implies that Maple T.A. should be a better flow activity. This research has been driven by this idea, as well as the lack of previous research into electronic assessments like Maple T.A.

III. Method

- Sample- 27 of 30 Calculus I students in Dr. Chris Hlas’s Class
- Time- 6 weeks during Fall Semester 2009
- Data Collection- One survey is imbedded randomly in each Maple T.A. homework assignment. Assignments were given twice a week and students were able to complete each assignment a maximum of 5 times.
- Survey Content- Surveys gather student reports of Challenge and Skill variables, as well as data related to the time and place of assignment completion.
- Survey data- Participants completed an average of 22.8 surveys each (σ = 11.33), 619 surveys were attempted out of 767 (80.7%) assignments.
- 549 surveys (88.6%) were complete.

IV. Results

Correlation Results

- Enjoyment
  - with Challenge (-.411)
  - with Skill (.224)
- Skills
  - with Challenge (-.277)
  - with Correct Responses (.176)
  - with Assignment Scores (.226)
- Note: The Pearson correlation coefficients are at least at the 99% confidence level.

Correlation Conclusions

- The negative correlation between Challenge and Enjoyment is significant.
- Possible Interpretations:
  I. Challenges are growing too fast for most students
  II. Students feel a lack of control regarding the challenge level
- The negative correlation between Challenge and Skill is the opposite of the desired correlation. Flow is most likely to occur when both challenges and skills are high.

Time and Location Data

- There is no significant difference in student rating of distraction level based on location
- The average time of day for assignment completion is 3-5 pm (at 99% confidence level) Note: Assignments are due at 5 pm.

Resources