Elevating Learning Motivation and Engagement with Online Learning

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Elevating Learning Motivation and Engagement

This presentation outlines relevant motivation theories that could be considered for learning design. A case study on how the motivational principles are applied in a course is presented. Finally, recommendations for course design will also be discussed in this session.
Advantages and Challenges of Online Learning

**Advantages**
- Personalized and customized learning spaces.
- Ubiquitous and flexible learning.
- Facilities for multi-media, interactive and collaborative learning.
- Facilities for formative assessments and feedback.

**Challenges**
- Under-utilization of the learning facilities and opportunities.
- Require learner motivation and self-regulation.
- Require discernment and guidance on learning strategies and focus.
- Feelings of isolation, confusion or frustration in isolated learning spaces.
## How can we elevate learning motivation?

### Motivational Theories

<table>
<thead>
<tr>
<th>Motivational Theory</th>
<th>Description</th>
<th>Principles for Learning Design</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Expectancy-value theory</strong></td>
<td>Motivation is influenced by the probability of success at a task and the incentive value of the success.</td>
<td>Create opportunities for learners to succeed in learning tasks. Break down broad learning objectives to smaller manageable chunks.</td>
</tr>
<tr>
<td><em>(Atkinson, 1964; Rotter, 1966)</em></td>
<td></td>
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<tr>
<td><strong>Self-efficacy theory</strong></td>
<td>The sense of self-efficacy influences effort and perseverance in challenges.</td>
<td>Self-efficacy may be increased by adopting short term goals and receiving performance-contingent rewards.</td>
</tr>
<tr>
<td><em>(Bandura, 1989; Pintrich &amp; de Groot, 1990; Schunk, 1991)</em></td>
<td></td>
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<tr>
<td><strong>Self-determination theory</strong></td>
<td>Motivation is influenced by supporting the psychological needs of autonomy and competence.</td>
<td>Create a learning environment where there is freedom to fail and practice cycles to build mastery.</td>
</tr>
<tr>
<td><em>(Ryan &amp; Deci, 2000)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Goal orientation</strong></td>
<td>Some individuals self-assess their abilities through achieving mastery in a task while other individuals self-assess by comparing themselves with others.</td>
<td>Learners with mastery goals thrive with practice opportunities and achievement rewards (e.g. achievement badges). Learners with performance goals assess through rank comparison (e.g. leaderboards).</td>
</tr>
<tr>
<td><em>(Dweck &amp; Leggett, 1988; Nicholls, 1984)</em></td>
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</tbody>
</table>
A case study – Physics course

• Interactive online learning activities in the form of practice quizzes were created in the LMS.

• Practice quizzes for each topic had the following features:
  • 5 questions were posed for each attempt.
  • Questions were randomised from a question bank.
  • Variables in questions were randomised.
  • Submissions were auto-graded by the system.
  • Feedback was provided upon submission.
  • Unlimited attempts were provided.
  • The quizzes were ungraded and available throughout the semester.
A case study – Physics course

Example of questions in a test pool

<table>
<thead>
<tr>
<th>Question Text</th>
<th>Question Type</th>
<th>Default Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>On a particular railway, a train driver applies the brake of the train at a y...</td>
<td>Calculated Formula</td>
<td>2</td>
</tr>
<tr>
<td>A bicycle brakes so that it undergoes uniform deceleration from a speed of ...</td>
<td>Calculated Formula</td>
<td>2</td>
</tr>
<tr>
<td>A goods train passes through a station at a steady speed of ( v ) m/s=1. An en...</td>
<td>Calculated Formula</td>
<td>2</td>
</tr>
<tr>
<td>A science museum designs an experiment to show the fall of a feather in a ver...</td>
<td>Calculated Formula</td>
<td>2</td>
</tr>
<tr>
<td>A body with initial velocity ( v_0 ) m/s moves along a straight line with constan...</td>
<td>Calculated Formula</td>
<td>2</td>
</tr>
<tr>
<td>A car starts from rest and coasts down a hill with constant acceleration. If ...</td>
<td>Calculated Formula</td>
<td>2</td>
</tr>
<tr>
<td>A car is accelerating/decelerating uniformly as it passes two check points th...</td>
<td>Calculated Formula</td>
<td>2</td>
</tr>
<tr>
<td>A plane starts from rest and accelerates along the ground before takeoff. It ...</td>
<td>Calculated Formula</td>
<td>2</td>
</tr>
<tr>
<td>A rocket-propelled car starts from rest at ( x = 0 ) and moves in the ( + ) direction...</td>
<td>Calculated Formula</td>
<td>2</td>
</tr>
<tr>
<td>A body falls freely from rest. Find the time ( t ) required to reach a speed of...</td>
<td>Calculated Formula</td>
<td>2</td>
</tr>
<tr>
<td>A stone is thrown downward with the initial speed ( v_0 ) m/s from a height of ...</td>
<td>Calculated Formula</td>
<td>2</td>
</tr>
<tr>
<td>A ball thrown vertically upwards returns to its starting point in ( t ) s. Find...</td>
<td>Calculated Formula</td>
<td>2</td>
</tr>
<tr>
<td>An anti-aircraft shell is fired vertically upwards with an initial velocity of...</td>
<td>Calculated Formula</td>
<td>2</td>
</tr>
</tbody>
</table>
**A case study – Physics course**

**Details: Calculated Formula Question**

**Question**
A bicycle brakes so that it undergoes uniform deceleration from a speed of \([w]\) m s\(^{-1}\) to \([x]\) m s\(^{-1}\) over a distance of \([y]\) m. If the deceleration of the bicycle remains constant, what further distance (m) will it travel before coming to rest?

**Answer**

<table>
<thead>
<tr>
<th>Answer Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ \frac{x^2}{2 \left( \frac{w^2 - x^2}{2y} \right)} ]</td>
</tr>
</tbody>
</table>

**Precision**
Decimal

**Answer Range +/-**
\( \pm 0.01 \)

**Number of Answer Sets**
10

**Correct Feedback**
Correct!

**Incorrect Feedback**

\[ \text{Find deceleration, } a = \frac{v^2 - u^2}{2s} \]

Apply "a" to find the further distance traveled,

\[ s' = \frac{v'^2 - u'^2}{2a}, \ v' = 0 \]
A case study – Physics course

• Problems posed optimal challenges to students.
• Points were awarded for each question.
• Upon submission, students could view the points earned.
• Feedback was provided:
  • Praise for correct answers.
  • Guidance/hints for incorrect answers.
• Badges were awarded for achieving full points.
A case study – Physics course

Achievement badges were awarded when full scores were achieved for the topic quizzes.
A case study – Physics course

• A course leaderboard was created to display the badges earned by students.
• Students were identified by their matriculation numbers to provide a level of anonymity.
  • Students can compare their achievement with others.
  • The badges symbolize mastery for the topics.
  • Anonymity reduces negative feelings such as embarrassment or pressure that may thwart the sense of autonomy.
A case study – Physics course

There was high student engagement with the practice quizzes throughout the semester.
A case study – Physics course

Course analytics report showed that there was a strong positive correlation between course access (quiz attempts) with the grade center score (test performance).
Experimental Findings

Statistical comparison between the control (\(n = 57\)) and experimental (\(n=60\)) cohorts

Summary of univariate ANOVA for DV’s of the study

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>F statistic</th>
<th>Mean difference</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrinsic Motivation</td>
<td>7.652</td>
<td>0.51*</td>
<td>.007</td>
</tr>
<tr>
<td>Amotivation</td>
<td>5.455</td>
<td>-0.45*</td>
<td>.021</td>
</tr>
<tr>
<td>Perceived Competence</td>
<td>.051</td>
<td>-0.05</td>
<td>.821</td>
</tr>
<tr>
<td>Perceived Autonomy</td>
<td>13.181</td>
<td>0.32*</td>
<td>.000</td>
</tr>
<tr>
<td>Engagement</td>
<td>9.988</td>
<td>4.70*</td>
<td>.002</td>
</tr>
</tbody>
</table>

\(*p \leq .05\)

- Motivation items were measured using the Intrinsic Motivation Inventory (IMI) (McAuley et al., 1989; Ryan, 1982) on a 7-point Likert Scale.
- Engagement was measured by number of average quiz attempts per student.
Students’ feedback on what motivates them

- If you get a badge of course you think you are the most amazing person in the world.

- The badges and the leaderboard gives you a sense of wanting to do more and also a sense of achievement if you get it.

- I think it’s fun to collect badges.

- The competitiveness is what made the students want to do the practice quizzes. Ego is what really motivates us to do more I feel.

- A sense of achievement will motivate us to do more.

- For me it’s just the sense of getting ten out of ten, finally.
Recommendations to Increase Learning Motivation

✓ Provide opportunities for learners to experience success through optimal learning challenges.
✓ Support the sense of autonomy by providing meaningful choices in learning activities.
✓ Provide the freedom to fail and opportunities to improve.
✓ Use game elements to capture learner attention and increase their interest for learning exercises.
✓ Support mastery and performance goals.
✓ Provide informational feedback and performance-contingent rewards.
✓ Gather learner feedback for continuous improvement to the learning design.
Thank you

Q & A session