Design considerations for creating eLearning animations

Subject Communication (Computer Science)

Sameer Sahasrabudhe
PhD student, YCMOU
PRN: SR0200149

Guides:
Prof. Sridhar Iyer, CSE, IITB
Prof. Sahana Murthy, ET IDP, IITB
Growing need for eContent

- More number of students and inadequate number of teachers [Banerjee, 2007]
- Digital access is growing in the country
- Archive the teaching methods of good teachers
- Potential of digital resources that can be used to facilitate learning and training, and which are available online, is rapidly increasing [Friesen, 2001]
- Learning Objects (LOs) constitute an appropriate medium
eLearning

Online courses  e-textbooks

Presentations  Simulations

Reports

Learning Object

Standalone unit with defined Learning objective and Assessment

1. L'Allier, 1997
Example of an LO

- Show screenshot of a good LO.
- Have call-outs to explain why it is a good LO.
Example 2

To determine the coordinates of a point on the curve of the studied dipole, it is sufficient for you to choose a pair of values (V, I).

You put the point by clicking at the right place on the chart. You can delete a point by clicking it.

"Game" is over when you place the fourth point.

Think about starting the "power supply".

Trick: selected integer values for V: the point will be easier to place.
Example 3

Welcome to OhmZone!

Here, you can build any kind of circuit you want. In the bottom-right hand corner of the screen, you have a battery, some lightbulbs and resistors, two switches and wires to connect everything together.

You can measure voltage using the voltmeter and current using the ammeter. Just place them over the part of the circuit that you want to measure.

If you need help in building circuits, there are two kinds of help available:

- click this button on the display below to turn 'Popups' on. Then, when you roll the mouse over something on the screen, OhmZone will tell you what that thing is.

- 'The Hand' will show you a list of exhibits on topics about circuits. Watch as OhmZone builds a circuit to help you with each topic.

After you build a circuit, click on the 'Visualize' button. This lets you see the current direction in any circuit that you build.
Example 4

When a short circuit occurs, there is zero resistance (R=0). The current will travel unhampered from the

\[ I_{sc} = \frac{E}{r} \]
What is the problem?

- Both functionality and form are important.
- Inadequate attention to either leads to a “bad” LO.
- How do we ensure that:
  - The LO depicts what was intended (correct functionality)
  - The LO depicts it in the way it was intended (correct form)
LO creation

Not merely a programming task!

Involves stakeholders from multiple domains
Iterations based on the reviews by the stakeholders

Major challenges:
Exact transfer of the information across domains
Using common language
Ensuring usability of the enduser
Knowledge expertise of the stakeholders

- **Subject Matter Expert (SME)**
  - Strong subject matter
  - Good pedagogy
  - Less design

- **Instruction Designer (ID)**
  - Strong pedagogy
  - Moderate subject matter
  - Moderate design
  - Overall coordination

- **Animator**
  - Moderate design
  - Less pedagogy
  - Less/No subject matter

- **Learning Object (LO)**
Possible solution approaches

For rapid creation of usable and effective LOs:

- More skilled personnel
  - Not a practical solution
- More face-to-face interaction
  - Non availability of the time of experts

Our approach:

- Operationalize VC principles for elearning.
- Capture VC expertise into a template.
Typical life cycle for LO creation

**Observations:**

- SME, ID or end users find usability problems in the LO
- SME and ID cannot often give the necessary visual inputs
- Animator can go wrong if inadequate information about subject matter is provided

---

2. Weerasinghe, Boot
Communication: Is it adequate?

Subject Matter Expert (SME) → CSF → Instruction Designer (ID) → IDD

Animator → LO

Confusion points:
- Subject Matter Expert (SME)
- Instruction Designer (ID)
- CSF
- IDD
Example: problem due to lack of prompts in template

Given: The machine consists of a set of independently rotating cylinders through which electrical pulses can flow. Each cylinder has 'n' input pins and 'n' output pins, with internal wiring that connects each input pin to a unique output pin, where each input and output pin can be associated with a letter of the alphabet.

**Instructions:** If the key for letter A is depressed, an electric signal is applied to the first pin in the first cylinder and flows through the internal connection to the (n-1)th output pin. After each input key is depressed, the cylinder rotates one position, so that the internal connections are shifted accordingly. After 'n' letters of plaintext, the cylinder would be back to the initial position.

No clarity after which output pin and second.
Example: problem due to lack of prompts in template
Focus of our research

[Diagram showing the roles and interactions: SME, Concept, ID expert, VC expert, CSF, ID, IDD, GD, Storyboard, Animator.]

Legend:
- SME: Subject matter expert
- ID expert: Instructional design expert
- VC expert: Visual communication expert
- ID: Instructional designer
- IDD: Instructional design document
- GD: Graphic designer
- Text+Visual communication
- Face to face communication

[Sahasrabudhe]
Interactions between stakeholders regarding VC

<table>
<thead>
<tr>
<th>Team members</th>
<th>Topics of decisions</th>
</tr>
</thead>
</table>
| SME with Lead ID and Lead VC     | 1. To decide the pedagogy approach  
2. To decide the visual presentation and user interaction pattern |
| Lead VC with Lead ID              | 1. Finalizing the visual presentation pattern which is suitable for the pedagogical approach selected |
| Lead VC with GD                   | 1. Explaining the way in which the visual presentation pattern has to be realized in the final LO  
2. Details of the placement and colour scheme to be finalized |
| GD with ID                        | 1. Exact mapping of the interactive elements                                          |
| GD with ID and Animator           | 1. Finalizing the placement and interactivity decisions based on format specified by VC expert.  
2. Finalizing animation style and motion |
Our solution:

- **Our approach:**
  - Operationalize VC principles for elearning.
  - Capture VC expertise into a template.
Details (of the rest of the presentation)

• Research questions
• Choice and adaptation of research method
  • 3 research cycles
    – Operationalization of VC principles
• Final experiment/s
• Results and analysis
Communication angle

- Primary communication
Research Questions

Would students find the LOs created using a template having VC principles embedded, to be more usable than the LOs created using a template without VC principles?

- Do ID writers find our ID templates having VC principles usable?
- Do animators find IDDs created by the above ID writers usable?
- Do students find the LOs created by the above animators usable?
Variables

Independent: Principles applied in the intervention

Proven principles from visual communication domains like graphic design, multimedia, animation and interaction design.

Dependent: Usability of the intervention

Proven constructs to test the usability of interactive eLearning content like: perceived usefulness, ease of use, format, accuracy and content
Hypotheses

$H_0$ No difference would be seen in the usability scores of the LOs created using ID templates having VC principles embedded in it and LOs created using ID template without VC principles embedded in it.

$H_1$ There would be increase in the usability scores of the LOs created using ID templates having VC principles embedded in it and LOs created using ID template without VC principles embedded in it.
Choice of research method

Complex nature of the context:
- Multiple stakeholders
- Communication/information flow
- Multiple interactions between the stakeholders

To benefit from those interactions a combination of methods is required.
Choice of research method

Iterations involved in creation of the interventions and its validation
- Not based on 'create once and use' format.
- Answers about why a certain intervention (created using 'X' theory) was found effective/not effective.

Requires a method which can combine empirical data and (underlining) theories used in creating the intervention.

This process would then be replicated to validate and justify other principle/s.
Design-based research overview

Design-based research

- Analysis of practical problems by researchers and practitioners in collaboration
- Development of solutions informed by existing design principles and technological innovations
- Iterative cycles of testing and refinement of solutions in practice
- Reflection to produce "design principles" and enhance solution implementation

Refinement of problems, solutions, methods, and design principles
### Choice of research method

#### Multiple interacting variables and levels

<table>
<thead>
<tr>
<th>Educational background of the ID writers</th>
<th>Graduate level education. Additionally, a postgraduate level education in ID is desirable.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work experience of ID writers</td>
<td>Work experience of 6-10 months of ID for an educational institution or in an eLearning production setup.</td>
</tr>
<tr>
<td>Educational background of Animators</td>
<td>Graduate level education in design/animation. Additionally, a postgraduate level education for the animation software (~1 year) is desirable.</td>
</tr>
<tr>
<td>Work experience of animators</td>
<td>Work experience of 6-10 months of animation for an educational institution.</td>
</tr>
<tr>
<td>Face to face communication between the stakeholders</td>
<td>Less or no face-to-face interaction between the team members producing LOs.</td>
</tr>
</tbody>
</table>
Research methodology

- Complex nature of the context
- Iterative process
- Standardize the production

Design Based Research

Reeves  Plomp  Wademan

IDT  
User testing  Results and analysis  Modifications  IDT*

Operationalization of VC principles
Typical research cycle

1. Identify problems
2. Search solutions
3. Create intervention
4. Test/Validate intervention

If feedback is not usable
Repeat research cycles, until it is usable

If feedback is usable
Publish the results for replication by others
Research method implementation

Research Cycle 1
- Create Intervention (ID template)
  - Find IDTs
  - Use review of literature to find an ID template
- Create Intervention IDT1
  - Give IDT1 to ID writers
  - Identify communication problems between animator and ID
- Find VC principles
  - Identify problems with IDT1
- Conduct focussed literature survey
- Modify intervention (ID template)
  - Need to modify
- Validate Research Cycle 1

Research Cycle 2
- Create IDT2 by applying VC principles
  - Give IDT2 to ID writers
  - Need to refine
- Create VCIIDDs and test their usability
- Search for alternate levels of applying VC principles
- Validate Research Cycle 2

Research Cycle 3
- Refine intervention (ID template)
  - Find appropriate levels
- Create IDT3 by refining the application of principles
  - Give IDT3 to ID writers
- Identify problems with application of VC principles in IDT2
- Create and test usability of IDDTs and LO3s
- Final results and analysis
- Publish about IDT3
Tool: System Usability Scale (SUS)

- Technology independent: SUS can be used online as well as offline
- Easy to modify: Original SUS form contains 10 questions, in a specific format. It also allows modification of questions, based on the context in which it is being used.
- It is relatively quick and easy to use by both study participants and administrators: 10 questions with 5 point Likert scale
- SUS provides a single score on a scale: formula*
- It is nonproprietary: It is free to use

*formula not provided in the text.
## Overview of three research cycles

<table>
<thead>
<tr>
<th>Template</th>
<th>Stakeholders</th>
<th>Artefacts</th>
<th>Results</th>
<th>Modifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>RC1</td>
<td>IDT1</td>
<td>Animators</td>
<td>10 IDD1s</td>
<td>IDD1s not usable</td>
</tr>
<tr>
<td>RC2</td>
<td>IDT2</td>
<td>Animators</td>
<td>12 IDD2s</td>
<td>IDD2s are usable</td>
</tr>
<tr>
<td>RC3</td>
<td>IDT3</td>
<td>ID writers</td>
<td>12 IDD2s</td>
<td>IDT2 is not usable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ID writers</td>
<td>14 IDD3s</td>
<td>IDT3 is usable</td>
</tr>
</tbody>
</table>
Focussed literature survey

Principles from domains which are useful for LO creation:

- Animation: Disney, Pixar
- Graphic design: Gestalts
- Multimedia: Mayer and Clark
- Interaction design: Sharp, Preece & Rogers
## Literature review

<table>
<thead>
<tr>
<th>Animation</th>
<th>Graphic design</th>
<th>Interaction design</th>
<th>Multimedia design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principles referred from</td>
<td>The Illusion of Life: by Thomas Frank and Ollie Johnston</td>
<td>Gestalts laws of design</td>
<td>Interaction design: by Sharp, Rogers, and Preece</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The essentials of interaction design: by Cooper, Reinman, and Cronin</td>
</tr>
<tr>
<td>Principles found suitable for applying in LO creation process</td>
<td>Staging, Timing Follow Through and Overlapping Action Secondary Action Slow In and Slow Out Pose to Pose action Appeal.</td>
<td>Figure-Ground Focal Point Proximity Continuation Unity/Harmony Similarity Balance/Symmetry Good Form</td>
<td>Visibility Feedback Constraints Mapping Affordance Consistency</td>
</tr>
<tr>
<td></td>
<td>These can be applied after modification: Anticipation Arcs</td>
<td></td>
<td>Multimedia Contiguity Modality Redundancy Coherence</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Principles NOT found suitable for applying in LO creation process</td>
<td>Squash and stretch, Straight Ahead Action Exaggeration</td>
<td>Closure Isomorphic Correspondence Simplicity</td>
<td></td>
</tr>
</tbody>
</table>

Back to Phase 2
## Implementation of research cycles

<table>
<thead>
<tr>
<th>RC1</th>
<th>RC2</th>
<th>RC3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usability score for IDT1</td>
<td>Usability score for IDT2</td>
<td>Usability score for IDT3</td>
</tr>
<tr>
<td>Animators</td>
<td>Animators</td>
<td></td>
</tr>
<tr>
<td>34.75</td>
<td><strong>68.75</strong></td>
<td></td>
</tr>
<tr>
<td>ID writers</td>
<td>ID writers</td>
<td></td>
</tr>
<tr>
<td>54.16</td>
<td></td>
<td><strong>69.42</strong></td>
</tr>
</tbody>
</table>
Usability experiments

Artifacts:

- LOs created using two levels of templates
- Tested with students for the usability

<table>
<thead>
<tr>
<th>Subject</th>
<th>IDT2</th>
<th>IDT3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image thresholding</td>
<td>LO2₁</td>
<td>LO3₁</td>
</tr>
<tr>
<td>Line coding</td>
<td>LO2₂</td>
<td>LO3₂</td>
</tr>
</tbody>
</table>
Usability experiments

Short demo of the LOs:

- Image processing: ITLO\(_2\) and ITLO\(_3\)
- Line coding: LCLO\(_2\) and LCLO\(_3\)
Sample for the usability test

- Convenient sampling technique
- Under graduate students from engineering colleges affiliated to Mumbai University, who have undergone a course on Image Thresholding OR Line Coding (n=128)
- Three colleges were included in the sample, to test the generalizability of the intervention.
Testing instrument

Survey form

- Having seven statements
- Three point likert scale: Agree, Neutral or Disagree
- Constructs
  - Perceived usefulness
  - Ease of use in terms of navigation and interactivity options
  - Feedback of the interactive elements and response features
  - Accuracy and correctness of the content.
## Testing instrument

<table>
<thead>
<tr>
<th>Construct</th>
<th>Actual statement in the questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived usefulness</td>
<td>Concept is presented in an interesting manner in the animation</td>
</tr>
<tr>
<td>Ease of use</td>
<td>Interaction design features like buttons, tabs and other options help navigation through the animation</td>
</tr>
<tr>
<td>Format</td>
<td>Interaction design features like sliders, buttons, drop downs and other options in the animation are easy to use</td>
</tr>
<tr>
<td>Content</td>
<td>Features like sliders, buttons, drop downs and others display the output as expected after using them</td>
</tr>
<tr>
<td></td>
<td>Feedback of the response features like, pop-ups, explanation instructional text and others help in interacting with the animation</td>
</tr>
<tr>
<td></td>
<td>Animation provides sufficient examples to understand the concept</td>
</tr>
</tbody>
</table>
Testing instrument

• Validity
  • Interviewing experts (n=3), and modifying the statements based on their feedback

• Reliability
  • Test administered on students (not part of the final sample (n=10)
  • Cronbach alpha for the feedback given by students (for seven statements) was found greater than the accepted value of 0.6

<table>
<thead>
<tr>
<th>Cronbach Alpha and Related Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Items</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>All items</td>
</tr>
</tbody>
</table>
Process

- Distribution of the total sample (n=128) was done as per the availability of the students.

<table>
<thead>
<tr>
<th>Topic</th>
<th>1. Image thresholding</th>
<th>2. Line coding</th>
</tr>
</thead>
<tbody>
<tr>
<td>College 1</td>
<td>23 students</td>
<td>-</td>
</tr>
<tr>
<td>College 2</td>
<td>45 students</td>
<td>22 students</td>
</tr>
<tr>
<td>College 3</td>
<td>-</td>
<td>42 students</td>
</tr>
<tr>
<td>Total</td>
<td>68 students</td>
<td>64 students</td>
</tr>
</tbody>
</table>
Process

- Students were asked to open LO2 (having basic VC principles) on their respective computer terminal.
- Usability questionnaire A (paper based) was given to the students to give feedback about the LO2.
  20 minutes were given to interact with LO2.
- Additional 10 minutes were given to fill up the questionnaire.
- The feedback forms were collected.
- Students were instructed to open LO3 (having advanced VC principles) on their respective terminal.
- Usability questionnaire B was given to the students to give feedback about the LO3.
- 20 minutes were given to interact with LO3.
- The feedback was collected.
- The researcher thanked the students for their participation.
Process

The order of LOs (basic and advanced) was swapped for the next group of students to counter balance and avoid bias.

<table>
<thead>
<tr>
<th>Group 1</th>
<th>First LO</th>
<th>Second LO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>LO2_x (Basic)</td>
<td>LO3_x (Advanced)</td>
</tr>
<tr>
<td>Group 2</td>
<td>LO3_x (Advanced)</td>
<td>LO2_x (Basic)</td>
</tr>
</tbody>
</table>
Data analysis

Wilcoxon matched pair signed rank test was found appropriate for the data analysis of the experiment (Bruin, 2011), since it is recommended under the following conditions:

- Data are paired and come from the same population (Same population in this research).
- Data are measured on an ordinal scale (3 point Likert), but need not be normal.
Feedback comparison (usability scores)

Subject Communication

Legend:
- Usable
- Partly usable
- Not usable

Image thresholding  Line coding

LO2₁  LO2₂  LO3₁  LO3₂
Frequency of responses

A common trend of increase was seen, in the `Agree' scores of LO3s as compared to LO2s, for each statement.

**ITLO**

<table>
<thead>
<tr>
<th></th>
<th>S1 LO2</th>
<th>S1 LO3</th>
<th>S2 LO2</th>
<th>S2 LO3</th>
<th>S3 LO2</th>
<th>S3 LO3</th>
<th>S4 LO2</th>
<th>S4 LO3</th>
<th>S5 LO2</th>
<th>S5 LO3</th>
<th>S6 LO2</th>
<th>S6 LO3</th>
<th>S7 LO2</th>
<th>S7 LO3</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>38</td>
<td>53</td>
<td>34</td>
<td>52</td>
<td>41</td>
<td>51</td>
<td>44</td>
<td>56</td>
<td>39</td>
<td>49</td>
<td>43</td>
<td>52</td>
<td>41</td>
<td>57</td>
</tr>
<tr>
<td>N</td>
<td>23</td>
<td>13</td>
<td>24</td>
<td>12</td>
<td>18</td>
<td>13</td>
<td>17</td>
<td>11</td>
<td>22</td>
<td>16</td>
<td>22</td>
<td>13</td>
<td>25</td>
<td>09</td>
</tr>
<tr>
<td>D</td>
<td>07</td>
<td>02</td>
<td>10</td>
<td>04</td>
<td>09</td>
<td>04</td>
<td>07</td>
<td>01</td>
<td>07</td>
<td>03</td>
<td>03</td>
<td>03</td>
<td>02</td>
<td>02</td>
</tr>
</tbody>
</table>

*A: Agree, N: Neutral and D: Disagree*

**LCLO**

<table>
<thead>
<tr>
<th></th>
<th>S1 LO2</th>
<th>S1 LO3</th>
<th>S2 LO2</th>
<th>S2 LO3</th>
<th>S3 LO2</th>
<th>S3 LO3</th>
<th>S4 LO2</th>
<th>S4 LO3</th>
<th>S5 LO2</th>
<th>S5 LO3</th>
<th>S6 LO2</th>
<th>S6 LO3</th>
<th>S7 LO2</th>
<th>S7 LO3</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>38</td>
<td>48</td>
<td>46</td>
<td>49</td>
<td>42</td>
<td>53</td>
<td>41</td>
<td>50</td>
<td>40</td>
<td>48</td>
<td>35</td>
<td>46</td>
<td>47</td>
<td>56</td>
</tr>
<tr>
<td>N</td>
<td>19</td>
<td>15</td>
<td>16</td>
<td>15</td>
<td>15</td>
<td>10</td>
<td>22</td>
<td>14</td>
<td>19</td>
<td>15</td>
<td>26</td>
<td>18</td>
<td>15</td>
<td>08</td>
</tr>
<tr>
<td>D</td>
<td>07</td>
<td>01</td>
<td>02</td>
<td>00</td>
<td>07</td>
<td>01</td>
<td>01</td>
<td>00</td>
<td>05</td>
<td>01</td>
<td>03</td>
<td>00</td>
<td>02</td>
<td>00</td>
</tr>
</tbody>
</table>

*A: Agree, N: Neutral and D: Disagree*
Effect size of the results

**ITLOs**
Effect size is moderate  
(z-score = 3.771, p< 0.001)

**LCLOs**
Effect size is modest  
(z-score =-2.399, p <0.016)
Results of the engagement survey

SMEs

- Interactivity
  - Interesting and innovative forms of interactivity provided in LO3s.
- Interface design
  - "Look and feel" of LO3s was very good, user friendly.
- Learning and reinforcement
  - Combination of interaction design and pedagogy useful in making the LO3s more suitable for learning and reinforcement.
Results of the engagement survey

Students

- Mentioned a specific preference for LO3s in terms of the interactivity and engagement.

<table>
<thead>
<tr>
<th>Responses for the LOs created for Topic 1: Image thresholding</th>
<th>LO2₁</th>
<th>LO3₁</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statement</td>
<td>A</td>
<td>N</td>
</tr>
<tr>
<td>S1: I liked the look and feel of the LO</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>S2: Look and feel of the LO helped me in learning</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>S3: I find LO to be engaging</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>S4: Working with LO helped me learn</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

A: Agree, N: Neutral and D: Disagree

<table>
<thead>
<tr>
<th>Responses for the LOs created for Topic 2: Line Coding</th>
<th>LO2₂</th>
<th>LO3₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statement</td>
<td>A</td>
<td>N</td>
</tr>
<tr>
<td>S1: I liked the look and feel of the LO</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>S2: Look and feel of the LO helped me in learning</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>S3: I find LO to be engaging</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>S4: Working with LO helped me learn</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

A: Agree, N: Neutral and D: Disagree
Conclusions

- null hypothesis was rejected
  - since the data showed LO3s were significantly usable than LO2s (p=0.000; z=-3.771 for topic 1 and p=0.016; z=-2.399 for topic 2).

- alternate hypothesis was not rejected
  - since increase in the usability scores of LO3s, as compared to LO2s
Conclusions

- engagement experiment conducted for the students
  - LO3s more engaging than LO2s.
- unstructured interviews with the SMEs
  - usefulness in terms of learning: interactivity and the interface design of LO3s was more appealing than LO2s.

Intervention created in this research was found usable for the respective users.
Contributions

Theoretical

- Identifying the VC principles applicable for LO creation
- Operationalizing the VC principles in an IDT
- Refining the operationalization of VC principles so that the ID writers find it usable
- Creation of feedback instrument having usability and engagement constructs and validating it.

Artifacts

- ID templates: validated, and found usable by the stakeholders.
- Usability tools: modified tools with specific constructs addressed were created
- Learning objects: to be used in the future offerings of the courses.
Future work

- Generalization of templates for different domains
  - ID templates are required for eLearning content creation across domains. It would be beneficial to see whether the template having VC principles is able to create usable LOs.

- Software version of IDT
  - Prompts written as text may be ignored, therefore a software tool would be beneficial.

- Design Guidelines Document for animators
  - Not all the animators have sound design background. This document will help in achieving similar level of visual design.
Thank you
Additional Slides
A popular example of miscommunication

How the customer explained it
How the Project Leader understood it
How the Analyst designed it
How the Programmer wrote it
How the Business Consultant described it
How the project was documented
What operations installed
How the customer was billed
How it was supported
What the customer really needed
Processes followed at other organizations (Career Mantra)
Processes followed at other organizations (Career Mantra)

I. The requirement of the client is understood by our domain experts.

II. The experts enmesh their own knowledge with research and build raw content that is canny, current and complete. The raw content is then vetted with the client to ensure that nothing is missing or extraneous.

III. Storyboarding is then done by our experts in instructional design, graphic design and animation.

IV. The flow of the storyboard is then checked by our in house instructors and trainers to ensure that the flow of the storyboard is amenable to imparting instructions.

V. The content is then transformed into rich media by our GUI designers and animation experts.

VI. Where required, voice over is given to the presentation.

VII. A final quality check is done by the SMEs to filter inaccuracies, if any.

VIII. The module is packaged in CBT, SCORM, IMS etc as per client's requirement.
Processes followed at other organizations (AEL Data Services)
Processes followed at other organizations (AEL Data Services)
Processes followed at other organizations (AEL Data Services)

Multimedia Development Lifecycle

AEL Data eLearning Services

- Approved Storyboard
- Sourcing of Required Resources
- Creation of Assets (e.g., Graphics, Animations, etc.)
- Embedding Text, Images and other Multimedia Assets in accordance with approved Storyboard
- Overall Integration
- Browser and Platform Compatibility

The Client

- Voice over, video, etc., (if any)
- Client Review
- CRC1 Implementation
- Content for Client Review
- CRC2 Implementation
- Content for Client Review
- Client Approval
- Sign Off

Subject Communication

Sameer Sahasrabudhe

7th September 2015
Processes followed at other organizations
Report by: Sumeet Moghe, Thoughtworks

In recent months I've met over 50 elearning practitioners and evaluated at least 6 elearning firms. My inspiration for this series of posts has been what I've learnt about their style of learning design and how approaches we've tried internally at ThoughtWorks compare as a stark contrast. In today's post I want to outline the current state of elearning content development in the industry.
The Graphic Artist plays a very transactional role in the project. He works with descriptions provided by the Instructional Designer, without any considerations of whether the final output fits the image of the client or the learning material in the module.
Processes followed at other organizations
Report by: Sumeet Moghe, Thoughtworks
Background and Literature survey

- Animation in eLearning
  - Only carefully designed and appropriate graphics prove to be beneficial for conveying complex systems [Tversky, Morrison]
  - A systematic approach would be studied to design algorithms which can be applied by the content developers for effective animated content creation. [Thomas Huk]
  -Animations are useful in showing processes which have
    - Change over time
    - Complex viewing angles
Background and Literature survey continued

- Use of animations vis-a-vis camera videos
  - More control on the visual quality
  - Ability to show objects which cannot be captured or do not exist
  - Ability to show critical angles/situations which cannot be captured in videos
Background and Literature survey Continued

- Design principles for animations in eLearning
  - The categorization of the principles is an independent decision, and is influenced by the domain of the content to be created
  - In certain cases it extends to the medium used.
Definitions of important terms

LO: Learning object
SME: Subject matter expert
ID expert: Instructional design expert
ID: Instructional designer
VC expert: Visual communication expert
GD: Graphic designer
IDD: Instructional design document
IDT: Instructional design template
CSF: Concept selection form
Sample of an instruction slide from IDT 1
Example: Face-to-face interaction between the stakeholders

<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Topics of decisions (regarding the LO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SME with ID expert and VC expert</td>
<td>Pedagogy approach, Pattern of interactivity, Visual design strategy</td>
</tr>
<tr>
<td>ID expert and VC expert</td>
<td>Visual presentation pattern, suitable for the pedagogical approach selected</td>
</tr>
<tr>
<td>VC expert with GD</td>
<td>1. Visual presentation pattern for the LO</td>
</tr>
<tr>
<td></td>
<td>2. Details of the placement and colour scheme</td>
</tr>
<tr>
<td></td>
<td>3. Typography</td>
</tr>
<tr>
<td>GD with ID</td>
<td>1. Mapping of the interactive elements</td>
</tr>
<tr>
<td></td>
<td>2. Types and size of the buttons, their placement and relationship (what to show if the button is clicked)</td>
</tr>
<tr>
<td>GD with ID and Animator</td>
<td>1. Placement and interactivity decisions based on format specified by VC expert.</td>
</tr>
<tr>
<td></td>
<td>2. Animation style and motion</td>
</tr>
</tbody>
</table>
Implementation of our research methodology

Every phase has the following stages:

- **Stage 1**: Problem Identification
- **Stage 2**: Identification of tentative products and theories
- **Stage 3**: Applying tentative theories
- **Stage 4**: Prototyping & assessment of preliminary products & theories
- **Stage 5**: Problem resolution and advancement of theories

Iterations
Communication angle

- Primary communication
Research questions

- What is the information that is necessary for the ID which forces requirement of face-to-face interaction with the animator?
- Since the ID is not an VC expert, how to enable ID to provide VC information to the animator?
Scope:

- Subject domain of IDDs and LOs: Physics
- Academic level: concepts from B.Sc curriculum in Mumbai university

Limitations:

Findings of this research may not be applicable to
- Other eLearning mediums like eBooks,