ATTRACTIVEQUESTDESIGN

3D GameLab (right) allows students to see their progress across the curriculum. Innovative game-based structures like progress bars, badges, achievements, awards, and dynamic display is can motivate students to success.

Game-based Learning and The Importance of Attractive Quests.

Students learn more, experience more academic success, and are generally more satisfied with the educational experience when motivated and engaged in the curriculum. Video games and their characteristics have been found to motivate students, and in many cases improve academic performance, through a number of systems and tools native to gaming.

One of these new and emerging approaches to game-based educational design is quest-based learning. Much like the video game structures on which it is predicated, quest-based approaches can be organized around learner choice where participants choose from pools of individual quests (interactions, activities, missions, etc.) that accumulate experience points to satisfy the needs of the standards and curriculum. This highly personalized and tailored approach, shows promise as a compelling and powerful tool for learning and engagement. These approaches are especially compelling because game-based and quest-based learning and their unique pedagogies imply a practice somewhere between the serious work of education and the playful exploits of gaming.

The problem, if you will, is that we know very little about what constitutes effective educational quest design. Currently, the characteristics of attractive quest-based learning design represents a gap in our knowledge. Identifying attractive or compelling characteristics can inform teachers and instructional designers.

What are the characteristics of attractive quest-based learning?"

Knowledge Units and the Measure of Attractiveness

The framework and taxonomy for characteristics of learning objects was taken from the Digital Learning Object classification system (DLOs). In related but separate research, Wiley (2000), Redeker (2004), and McGreal (2003) suggest classification of individual Knowledge Units that can be digitally stored and used to assemble Learning Objects. These small pieces can serve any curricular goal they are assembled for, like an image of Rev. Martin Luther King might serve to support instruction on Civil Rights, great speeches, or pacifist ideology. The knowledge unit can be tied to any meaning the instructor choose. Originally developed by Wiley (2000) our colleague form Utah State, it was necessary to adapt the taxonomy to include types of knowledge units not yet developed.

The second issue of focus was that of attractiveness, specifically in an educational setting. Because learning choice in the selection of learning activities is novel rather than standard, research beyond engagement was difficult to find. Some research in serious game literature eluded to it, but none provided an easily usable framework or instrument. The committee was very instructive in the creation of one that took into account the variables unique to this setting and approach. This was done.

For the purposes of this study, quest "attractiveness" is defined as the operational relationship of three components: capturing one's interest, sustaining one's effort, and resulting in a meaningful, personally relevant (highly rated) learning experience. By this definition, it is possible to quantitatively characterize the student experience through the use recordable variables. Interest can be quantified by students viewing and choosing quests. Sustaining one's efforts can be quantified by quest completion. User rating can serve to quantify meaningful and personally relevant learning experiences. It was an effective framework, but as we'll discover, the system

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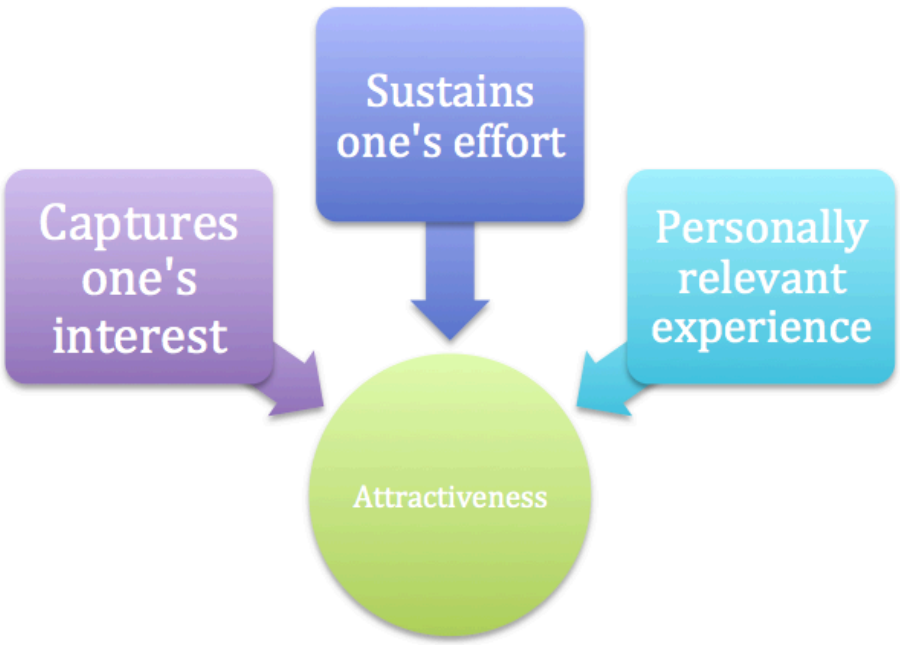


Findings
Critical questions, compelling answers

#1) What are the characteristics of educational quest as they currently exist in a 3-D GameLab? There are 73 separate characteristics in 5 categories listed here.

The most commonly occurring knowledge objects were text (65), hyperlinks (32), and video tutorials (12). The most commonly occurring organizational characteristics were accents(40), section headings (37), and bullets and numbering (31). There were more text-based (45) than goal-based (21). The most common digital tools used were Google Sites (22), blogger (11), spreadsheets (9), word processors (8), and games (7). The most common deliverables were reflections (16), various forms of digital text including blog posts (13), and embedded or linked objects (7).

#2) What is the taxonomy of quest characteristics (including combinations) currently used in the test group? (It is important to note that this also included question **#3.) What different types of quest construction (goals, activities, tools, deliverable, organization) exist?**

• Cluster #1 (N=10 quests, 15% of total quests) was comprised of quests where students interacted with the game and reflected on that experience using a blog. Quest designs and layouts consistently utilized headings and bullets, among other design elements.

• Cluster #2 (N=2, 3%) included only text, images, accents, and hyperlinks and asked the student to produce a text-based product.

• Cluster #3 (N=3, 5%) used VoiceThreads as a means of both interaction and deliverable.

• Cluster #4 (N=10, 15%) focused on the creation of portfolio elements utilizing digital text in their Google Site portfolio page.

• Cluster #5 (N=7, 11%) were tutorial and procedure-based quests to assist students in developing stylized spreadsheets.

• Cluster #6 (N=18, 27%) included text content, resources, videos, and other embedded objects to information didactically. These quests were all found in the Context category.

• Cluster #7 (N=10, 15%) was associated with the creation of word processor documents.

• Cluster #8 (N=6, 9%) utilized presentation software to both learn about and create presentations.

While many quests contained unique characteristics, all fit into one of these taxonomic clusters. Analysis of these clusters show that #4 and #6 were the most attractive while #7 and #8 were the least attractive to students.

#4) What combinations of variables produce more attractive quests visible through learner selection, completion, and rating? It also provided evidence for question **#5) Based on qualitative and quantitative measures, which design variables are most likely to contribute to the attractiveness of a quest, and thus, learner selection, completion and rating?**

Attractive quest design favors a task-based approach in that students are more likely to select quests that offer a clear path to completion. The data showed that task-based quests were more attractive then the goal-based quests by being more likely to capture the students interest and sustain their efforts to completion. Task-based quests contained tutorial videos, step-by-step instruction, and utilized procedural content. Students rated the goal-based quests more highly, however.

Interactions suggest that participants were attracted to quests related to portfolio creation, which served as the final product of the course. These quests were built around the creation of pages for a personal learning portfolio utilizing Google Sites. Each quest asked students to produce digital text and reflections using the wiki features of the site. Quest associated with the portfolio were clustered with those of high interest (HI) and high completion (HC). The implications are that educational quests that are connected directly to a final product are attractive both in high initial interest and high completion scores.

Students selected quests that utilized unique web tools like VoiceThread, Cinch, Prezi, Voki, iPod touch, uStream, Blogging, Aris, and other web-based and app-based productivity and creativity tools. However, not all of the quests that were quickly and easily selected were completed with the same regularity. Many continued to be attractive after selection while others were not. While the study design did not allow for differentiation of Web-based tool characteristics beyond tags, possible explanations for why some web tools lacked attractiveness through completion. It is possible that some participants found the Web-based tools initially attractive but difficult to use or understand. Experience with these types of web-based applications may also impact their attractiveness through completion as students may have a schema that can support their implementation and use. Future research could consider a student's technology proficiency profile in the data mining and analysis

Embedded Video Doesn't Automatically Make Quests Attractive. While some of the most attractive quests did contain embedded video, even more quests with mid to low attraction scores also contained embedded video. The characteristic of embedded video alone did not lead to quantifiable student attraction. While the research suggests that

Findings, implications, and significance

quantifiable student attraction. While the research suggests that embedded video may support attractive quest design, other characteristics related to the video may also impact attractiveness.

The study had no way to identify or catalogue the quality, length, or number of video elements embedded in a single quest. It is possible that a single, high impact, professionally produced video would be more attractive than a number of variable combinations of video design and implementation. It is also possible that different types of video content might be attractive to different students. This could be a compelling area of future research in quest-based learning design.

Because of the nature of the 5-star rating system, it is unclear whether this score is indicative of quest design, tools used, deliverable type, goal-based/task-based design, or any number of other variables. A quest pool that contains both task-based and goal-based versions of quests might be a valuable future consideration.

Interesting completion scores for word processing and spreadsheet related quests were lower than other categories. Tag cluster analysis showed other tools were more attractive to users. Independent of other quests, it is possible that these tools and their related quests would be attractive. However, in a learning environment where students may choose between activities, these were less attractive .

Implications

Currently, some 200 teachers and instructional designers use the 3-D GameLab LMS to administer some or all of their curriculum to several thousand students. Even more utilized game-based approaches in the classroom that include other methods of instructional design and delivery. This research suggests some approaches that could yield more attractive quest-based design.

1. Create task-based quests that contain tutorial videos, step-by-step instruction, and utilize procedural content.
2. Create quests that have a clear connection to the final outcome of the class. This could be done by associating quests with badges like "jewels in a crown." Many students find these types of quests, those that mark progress, more attractive.
3. New or novel digital tools are more attractive than traditional productivity tools like those found in the Microsoft Office suite.
4. Video can be attractive. Although not definitive, the possibility that too much, uninteresting, or poorly produced video can inhibit the attraction beyond the initial selection. As such, un-engaging video could lead to a loss of attraction.
5. Writing digital text is more attractive through blogging or wiki writing than traditional desktop word processing. If writing is an essential component of student deliverables, savvy designers could look for alternate tools.

Significance

A study of characteristics of attractive quest-based learning serves future work in both research and pedagogical development across disciplines. The relationship of quest characteristics to attractiveness and quest success is outlined, thus further research can be planned and implemented. Findings in this area also suggests pedagogy for game-based and quest-based approaches.

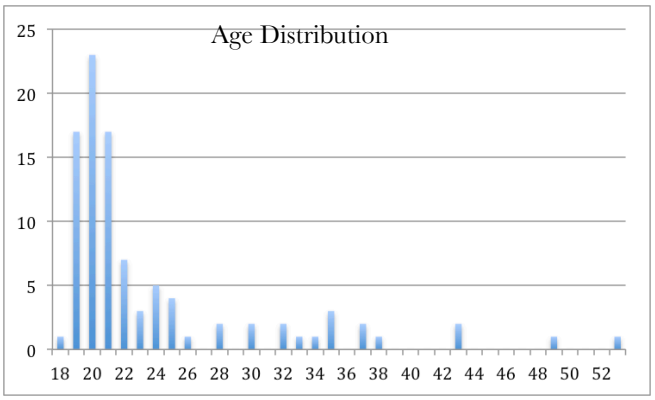
Further understanding of the characteristics associated with attractive educational quest design helps teachers and instructional designers develop learning activities more likely to attract, compel, and engage learners in this form of game-based learning.

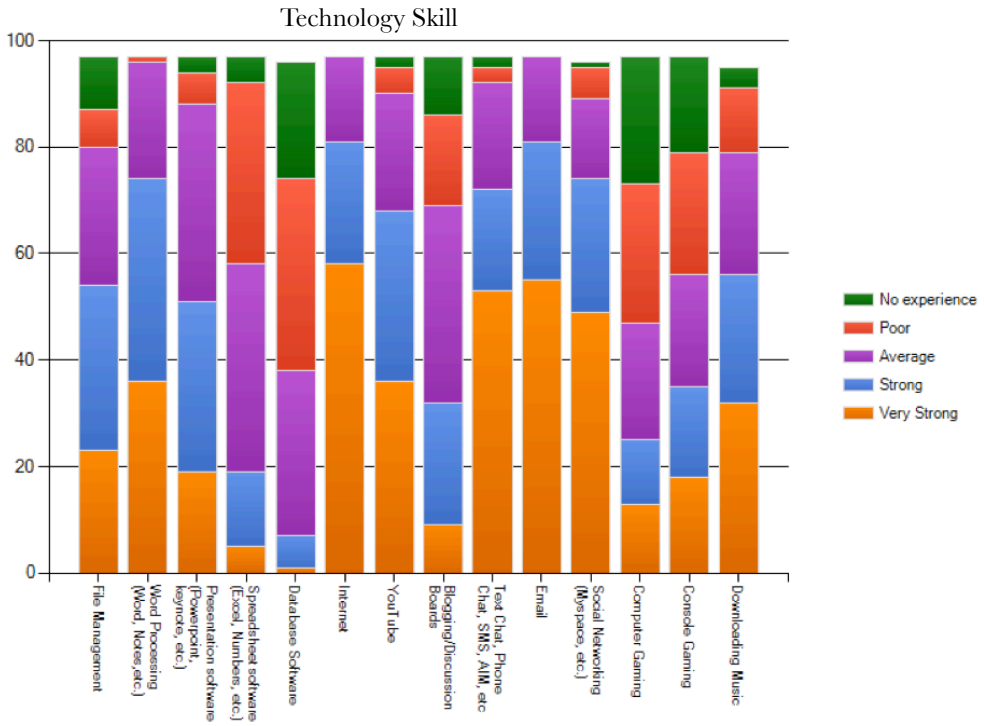
This research adds to the field by applying the theory of Digital Learning Objects in an authentic context. It builds upon previous work by beginning to evaluate the attractiveness and by implication the effectiveness of different Knowledge Units.

All of this could be foundational in a quest-based framework in learner analytics. These measures of attractiveness could eventually lead to the identification of unique learner profiles which could be leveraged to deliver the most attractive quests to students based on their profile and preferences.

I'm especially excited because this research leads me personally toward a scholarly career focused on both game-based and quest-based instructional design. Work in digital feedback systems for learners will likely develop in parallel with those of learner analytics. As teaching an instructional designer rely more heavily on digital tools, knowledge and expertise in these areas will become more important. Based on my own literature review, I see a Journal of Science Education & Technology, Games and Culture, Evaluation & Research in Education, Educational Technology, Journal of Educational Multimedia and Hypermdia, E-Learning, and of course Educational Technology Research and Development. I would also be open to any suggestions from the committee and my colleagues.

Key figures and Tables





Paired Attraction Clusters

Interest	Completion		
Cluster Pairs	High	Mid	Low
High	HI-HC	MI-HC	LI-HC
Mid	HI-MC	MI-MC	LI-MC
Low	HI-LC	MI-LC	LI-LC

Table 4-17: Distribution of Paired Attraction Clusters

Interest	Completion		
Cluster Pairs	High	Mid	Low
High	14	7	1
Mid	3	11	4
Low	5	4	13

	Coded variables/tags
Knowledge Objects	Text, image, table, hyperlinks, resource, example, video description, video content, video tutorial, embedded object-static, embedded object-interactive, narrative/role-play
Organizational Features	Headings, bullets, numbers, accents (bold, italics, underline, strike through), procedures, line/separator
Goal-based vs. Task-Based	Goal-based: Activities which provide an outline of the deliverable with freedom to embellish or create vs Task-Based: a detailed list of procedures which produce a uniform product.
Digital Tools	Apps store, ARIS, blogger, Camtasia, Cinch, email, games, Google document, Google Site, iPod touch, mobile device, none, presentation software, SmartBoard, spreadsheet, survey, twitter, Video camera, video production tools, video streaming, Voicethread, Voki, WebQuest, word processor, YouTube
Deliverable	Account creation, animated object, blog posts, choice, Cinch object, cooperative product, digital text, document-stylized, document-text, embed/link, embedded object, evaluation, none, participation, presentation, reflection, spreadsheet, video, video walk-through, VoiceThread participation, Webpage, wiki

Clusters	Percentage	Frequency	Tags
1	15%	10	bullet, heading, +game, + blogger, blog
2	3%	2	hyperlinks, + image, + text ,+ accent, + task-based
3	5%	3	embedded object-interactive, Voicethread, evaluation
4	15%	10	wiki, portfolio, Google site, digital text
5	11%	7	Tutorial, + procedure, hyperlinks, spreadsheet, + task-based
6	27%	18	Content, + resources, video, + embed, context,
7	15%	10	word, processing, word processor, + goal-based, Google
8	9%	6	presentation software, + presentation, + goal-based, + accent

Taxonomy Cluster Quest Distribution by Interest and Completion Paired Clusters

Clusters	HI-HC	HI-MC	HI-LC	MI-HC	MI-MC	MI-LC	LI-HC	LI-MC	LI-LC	Total
1				1	2	3	2		2	10
2	1			1						2
3	1					1		1		3
4	6	3			1					10
5	2	2			1			2		7
6	3	2	1	1	2	3			6	18
7					2	1	2	1	4	10
8	1				3		1		1	6
Total	14	7	1	3	11	8	5	4	13	66