Once Again, Games Can and Do Teach! (Feb 13)

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In a recent article by Ruth Clark in *Learning Solutions Magazine*, titled "Why Games Don't Teach," she makes the claim that "games don't teach." She goes on to say, "Not that games can't teach, but that advocating games as a main or even frequent instructional strategy is misleading." There are a number of claims and statements Clark makes that deserve further attention.

Research findings: games teach

Contrary to Clark's assertion, there is solid research and overwhelmingly compelling evidence that games can and do teach a variety of subjects effectively. In fact, there is a rapidly growing body of empirical evidence that repudiates Clark's claim. Let's look at just a few pieces of this evidence.

In a paper titled "Does Game-based Learning Work? Results From Three Recent Studies," the author, Richard Blunt of the Advanced Distributed Learning (ADL) group, reported on three causal-comparative exploratory studies. ADL, founded in 1997, works with business and university groups to develop consensus around standards for training software as well as associated training services purchased by federal agencies.

ADL reported on studies that examined the difference in academic achievement among students who did and did not use video games for learning. Researchers added three different video games to approximately half the classes of freshman introduction to business and technology courses, third-year economics courses, and third-year management courses. All courses imposed identical testing situations, while data collected included game use, test scores, gender, ethnicity, and age. Analytic methods testing game-use effectiveness included ANOVA, chi-squared, and t-tests.

The findings indicated that the mean scores of students in classes using the game were significantly higher than those of students in classes that did not. There were no significant differences between genders, yet both genders scored significantly higher with game play. There were no significant differences between ethnicities, yet all ethnic groups scored significantly higher with game play. Students 40 years and under scored significantly higher with game play, while students 41 and older did not. Blunt further indicates that "these studies add definitive research in the area of game-based learning. The DoD now has studies proving the efficacy of digital game-based learning and how it can improve learning."

While three studies indicating learning from games is a start, and already debunks the myth that "games don't teach," one could make an argument that it is hardly a foundation for making the assertion that games teach. True, but this is not the only research indicating games are effective teachers.

Connolly, et al. (2011) looked at more studies and reached the same conclusion. They conducted a meta-analysis (study of studies) by reviewing 129 papers reporting evidence related to the impacts and outcomes of computer games and serious games with respect to learning and engagement. The majority of the studies reviewed—121 (94 percent)—reported quantitative data, with eight (six percent) reporting qualitative data. One strong conclusion they reached was that the most "frequently occurring outcomes and impacts were knowledge acquisition/content understanding and affective and motivational outcomes." Certainly, knowledge acquisition and content understanding are learning—learning from games.

In the two meta-analysis papers Clark reports on, both authors indicated that games teach (see comments on original article). These findings from Blunt, Connolly, et al., Hays, Sitzmann, and others support the argument that games teach and positively impact motivation. This isn't looking at one isolated study. It is looking at over a hundred studies both qualitative and quantitative, from different meta-analysis studies and individual studies. The evidence is clear and compelling.

So the statement "games don't teach" is simply not supported by the evidence. The preponderance of evidence is that games can and do teach. Now does every game teach? No. Neither does every lecture or every online course.

Games also have the additional benefit of changing behavior. See research studies outlined in "Can a Video Game Make Someone Nice? The Positive Impact of Pro-social Games" and in "Using Games and Avatars to Change Learner Behavior."

Why we need games

One thing people forget is that part of the need for games in learning is that our current learning paradigm is ineffective. Learners are not going to undertake even the most wonderfully designed non-game intervention if they are not interested, if they are racing through multiple-choice questions to the quiz at the end, and if they have no hands-on practice. There is little "learning by doing," either in the classroom or online.

Predominately, delivery of corporate training and academic classes is through lectures (whether online or face-to-face), which are not effective for conveying knowledge and never have been. Gibbs (1981) stated that research done by Bligh (1972) could "not track down a single study which found lecturing to be more effective than another method for the promotion of thought." He identified 21 studies which found lecturing to be less effective than discussion, reading, individual work in class, and so on. The evidence on the weakness of lectures to achieve this goal is devastating. Bloom (1953) found that during lectures, students' thoughts involved attempting to solve problems, or synthesize, or inter-relate information for only one percent of the time, while 78 percent of the lecture was spent in "passive thoughts about the subject" and "irrelevant thoughts."

In 1994, researcher Isaacs (1994) observed, "Lectures are not a very effective way of teaching in higher education—especially if the aim is to teach thinking, or to change attitudes or other higher aims beyond the simple transmission of factual knowledge." Ironically, games can do all these things quite well.

In fact, one could make the same argument for a classroom as Clark does about the cognitive overhead in a game. When a learner is being taught sales skills in a classroom and he or she then tries to transfer those skills to an actual work situation, he or she encounters a great deal of cognitive overhead.

- The classroom doesn't look like the environment in which the salesperson works, so they must mentally make the transition
- The client doesn't ask you to raise your hand to answer a question they ask
- The statements made by the prospect are typically not provided in the same order as the model presented in class
- Interruptions occur that distract the prospect
- Role-plays are not always credible or portrayed realistically

It is for these reasons and others that Sitzmann found in her research across eight studies, self-efficacy (confidence) was 20 percent higher for trainees receiving instruction via a simulation game than for trainees in a comparison group. In other words, simulation games build more confidence for on-the-job application of learned knowledge than does classroom instruction. Why? Part of the answer is that a game environment actually has less cognitive overhead. The graphics can be more realistic and reflective of the actual work environment than the classroom environment, the person has to apply knowledge and not passively consume knowledge, and the learner can interact in a more realistic fashion with the prospect than he or she would in the classroom.

It's not that this couldn't happen in the classroom, but it's cumbersome to conduct a good role-play and give all 30 people in the class a chance to participate, and its time consuming and expensive to decorate a classroom like a prospect's office. It's hard to scale—an online game scales more easily than a classroom role-play.

Toward a taxonomy

Ironically, if one digs through the hyperbole of Clark's article, the crux of her argument is that practitioners don't have a taxonomy to guide them to determine when to use one type of game over another. She lists a sample taxonomy for defining graphics. A number of practitioners are currently creating these types of taxonomies. One such taxonomy involves the difference between teaching and testing games. A Jeopardy-style game or a trivia game would be appropriate for testing existing knowledge, although they are not appropriate for teaching new knowledge. See Testing Games vs. Teaching Games for more on that topic.

Another taxonomy under development and included in my book *The Gamification of Learning and Instruction* matches the type of knowledge to be learned with instructional strategies and the game elements that support those strategies. This type of tool can be used to aid a practitioner in determining the type of game design to use (see Table 1). *Editor's Note: This table may not format correctly on mobile phone screens in the portrait orientation. Please use landscape orientation to see the table correctly.*

Table 1. *Taxonomy: type of knowledge, instructional strategies, and game elements*

Type of Knowledge	Definition	Instructional Strategies	Game Elements	Example
Declarative Knowledge	An association between two or more objects. These are typically facts, jargon and acronyms. Content that must be memorized.	Elaboration. Organizing. Association. Repetition.	Stories/narrative. Sorting. Matching. Re-playability.	Drag-and-drop for association. Hangman.
Conceptual Knowledge	A grouping of similar or related ideas, events, or objects that have a common attribute or a set of common attributes.	Metaphoric devices. Examples and non-examples. Attribute classification.	Matching and sorting. Experiencing the concept.	Whack-A-Mole. Immersion on concept.
Rules-based Knowledge	A statement that expresses the relationships between concepts. Rules provide parameters dictating a preferred behavior with	Provide examples. Role-play.	Experience consequences.	Board games. Simulated work tasks.

	predictable results.			
Procedural Knowledge	A series of steps that must be followed in a particular order to reach a specific outcome. Step-by-step instructions for performing a task.	Start with the big picture, break process into pieces, teach pieces, and then reassemble. Teach “how” and “why.”	Software challenges. Practice.	Games that involve using software or equipment to achieve a goal.
Problem-solving	Learner is confronted with a novel situation and must use previous knowledge to solve the problem.	Provide multiple examples of different types of similar problems to solve.	Multiple scenarios, different settings to apply problem-solving skills.	Resource allocation games. Quest games.
Soft Skills	Non-sequential guidelines for dealing with social interactions. This includes negotiation skills, leadership skills, and selling skills.	Analogies. Role playing.	Simulating an encounter with another person or persons.	Branching. Story game. Leadership game.
Affective Knowledge	Knowledge about attitudes, interests, values, beliefs, and emotions.	Encourage participation. Believing success is possible. Celebrity endorsement.	Immersion. Providing success. Encouragement from celebrity-type figures.	Darfur is Dying.
Psychomotor Domain	The intersection of physical skills and cognitive knowledge.	Observe. Practice.	Demonstration. Haptic devices.	Virtual-surgery game.

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We also know a great deal about what makes a learning game effective. We know from Sitzmann and Hays that learning games are best when embedded into a larger curriculum rather than as standalone instructional elements. We know that for games to have transfer, the cognitive processes performed by the player must be the same as those performed on the job. The research is actually quite rich with information on how to create effective games for learning, so that games do what they can do … teach.

Conclusion

The evidence is clear that games can and do teach. We also know that online learning and lectures often do not teach. In the end, it isn’t the vehicle delivering the instruction that makes the difference, it’s the design. Well-designed instruction and well-designed games make a powerful impact on learners. The debate should not be whether games teach; instead, the debate should be how we leverage the best elements of games to create the best instruction for learners.

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