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Title

Play to Win! Using Games in Library Instruction to Enhance Student Learning

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Abstract

Research has shown that educational games can have positive impacts on student learning and motivation. The success of a game played in a library instruction class depends on the type of game selected, the development of learning outcomes, and the flexibility of the librarian during class. This article explains the benefits to students and librarians of using games, discusses the development and use of a Jeopardy-style game, and provides practical tips for librarians interested in developing and incorporating games into one-time library instruction sessions.

Keywords

Educational Games; Library Instruction; Academic Libraries; Student Learning; Jeopardy!; Instructional Materials

Play to Win! Using Games in Library Instruction to Enhance Student Learning

Introduction

A game can be defined as an activity that contains some or all of the following elements: rules, goals, challenges, fantasy, mystery, curiosity, competition, skill (Randel, Morris, Wetzel & Whitehill, 1992; Garris, Ahlers, & Driskell, 2002). Games that are adapted and used for educational purposes aim to have players achieve a specific learning outcome as the goal of the game (Garris et al.). Over the past decade, educators have reported using games as instructional tools in a variety of disciplines. Koether (2003) described the use of a "name game" to teach students chemical information, Gublo (2003) used a trivia game to teach laboratory safety methods, and Grabowski & Price (2003), Keck (2000) and Deavor (1996) developed individual variations of a science themed *Jeopardy*! to improve student retention of content in the areas of organic, general and biochemistry. Games have also been used in psychology courses to teach students abnormal psychology diagnoses, theories of personality, and research methods (Merwin, 2003). Other disciplines such as biology (Lauer, 2003; Franklin, Peat, & Lewis, 2003), nutrition (Lacey, 2003; Dooley, Novotny & Derrickson, 2001; Burns, 1999) and physiology (Howard, Collins, & DiCarlo, 2002; Bailey, Hsu, & DiCarlo, 1999) have incorporated various types of games, such as Wheel of Fortune, Bingo and crossword puzzles, into post-secondary classroom instruction.

Games used in undergraduate library instruction have been integrated into freshman orientation activities. For example, at Owens Library, Northwest Missouri State University, students engaged in a word find exercise or Jeopardy-style game at the end of a two week library orientation instruction program in order to reinforce the

material that had been taught (Ury & King, 1995). Krajewski and Piroli (2002) described how freshmen at Simmons College played a game of library Jeopardy during the second of two library sessions in order to find out about library services "in a non-intimidating, fun manner" (p. 181). Interestingly, a literature search on games in library instruction over the past decade failed to yield any articles describing the use of games in single occasion library instruction sessions.

Since there are many different types of games (video, simulation, online) it is difficult to generalize research findings from a study of one particular kind of game to all games in general. In addition, many articles written about the use of games in classroom instruction, including some of those cited above, are descriptive or anecdotal in nature and lack an evaluation component such as a retention test to address the impact of the game on student learning. Of the studies that have been done, the results have been mixed. Randel et al. (1992) conducted a survey of published research from 1963-1991, and found 67 empirical research studies that addressed the effectiveness of games versus traditional instruction in the areas of social sciences, math, language arts, physics, biology and logic. Slightly more than thirty percent of these studies showed increased student learning from games in contrast to conventional instruction, while a little more than half of the studies showed no difference between the two methods. However, subsequent to the Randel et al. survey, studies have shown increased knowledge retention by those using an educational game compared to those receiving conventional instruction (lectures and paper based materials) when specific information or concepts are targeted or the game is used as a reinforcement or practice tool (Gremmen & Potters, 1997; Klein &

Freitag, 1991; Krauss, 1999; Randel et al., 1992; Ricci, Salas, & Cannon-Bowers, 1996; Ury & King, 1995).

Research findings are more consistent in illustrating that across disciplines, educational games are beneficial to students because they can address different learning styles or preferences, provide immediate feedback, increase student motivation, and enhance a student's overall learning experience, all of which increase the chance of a positive learning outcome for the student (Randel et al., 1992). A 1991 study by Klein and Freitag showed evidence that an instructional game used by students to practice learning new concepts or information increased their motivation, as the game "had a positive affect [sic] on attention, relevance, confidence and satisfaction" of students (p. 111). Randal, et al. state that students find games "are more interesting than traditional classroom instruction" (p. 270). Lepper and Cordova (1992) concluded after a series of empirical investigations that "there are significant gains to be had when learning is viewed by students as play" (p. 203). A recent survey by the Pew Internet & American Life Project found that college students "associate positive feelings with gaming, such as 'pleasant', 'exciting' and 'challenging'" (Jones, 2003, p. 2).

Games and Millennials

Invariably, assessments and descriptions of Millennials, those born after 1982, emphasize the influence of information technology. Even so, they are not the only generation using computers, surfing the Internet, participating in chat groups, or any number of online activities. What is so different about this generation? Although their predecessors, Generation X and Y, may have embraced technology, the Millennials have grown up with it and do not know what life is like without it. According to one educator,

this lifelong exposure to technology and computers has created an information-age mindset (Frand, 2000). Frand has identified ten attributes that reflect the values and needs of the Millennials**,** such as computers are not technology, the Internet is better than television, multitasking, and staying connected (p. 14). In her article "Boomers, Gen-Xers, and Millennials: Understanding New Students," Diana Oblinger (2003) draws on the ideas of Frand and concludes that growing up in an online environment has contributed to students' high expectations regarding "service, immediacy, interactivity, and group activity" (p. 45). She recommends that educators take into account these expectations and consider how to eliminate delays, improve customer service, adapt instruction, and allow for students to stay connected (p. 42-44).

Focusing specifically on instruction, Joel Foreman, associate professor at George Mason University, considers the effects of digital game use and the implications for educators. He acknowledges that playing hours of "deeply engaging, visually dynamic, rapidly paced" digital games are significant formative experiences but concedes that "empirical studies have yet to prove that the game-playing generation actually think differently" (2003, p. 15). In his discussion of the information-age mindset, Frand explains that students are familiar with the trial-and-error approach to problem solving rather than careful consideration, an attribute he labels "Nintendo over logic" (2000, p. 170). Oblinger addresses student learning and suggests that the aptitudes, in addition to attitudes and expectations, of students who have grown up with technology may differ from those who have not (2003, p. 40). Although the extent to which Internet and digital game use influences student learning has yet to be determined, Oblinger and Foreman

agree with Frand that today's students have an information-age mindset to which educators must adapt.

In addition, Oblinger and Foreman agree that the lecture format, a tradition on college and university campuses and mainstay of instruction, may not be effective for engaging or maintaining the interest of tech-savvy students. According to Foreman, the lecture is for the most part "a one-way communication medium that relies principally on a single sensory channel: hearing" and as such allows "few opportunities to confirm that learning . . . is actually taking place" (p. 14). Both Foreman and Oblinger suggest using the graphic, interactive videogame format technology as an alternative. Their belief that the lecture is not the best method to reach students is not new or limited to the Millennials. In an article on teaching strategies for Generation X and Y, Snell (2000) suggests using as little lecture as possible in conjunction with active learning exercises to engage students that he believe have shortened attention spans. Similar advice is given by Catherine A. Lee (1996) in her discussion of library instruction for Generation X and Y. She advocates "present[ing] the material in short focused segments," using stimulating activities, and providing opportunities for interaction (p. 57). Although not specifically mentioned by either Snell or Lee, games are active learning exercises proven to engage and motivate students and increase knowledge retention. When librarians at California State University replaced an instruction reading assignment with a crossword puzzle, testing results showed a 10.02-10.75% improvement on questions testing recall of library terminology (Faust, Ginno, Laherty, Manuel, 2001, Learning style examples).

While using technologically advanced, highly graphic, interactive games to supplement or replace the lecture format may be commonplace in the future, games that

encourage active learning can and should be utilized now. The following sections outline the benefits of using games, including how they engage students in learning, address additional learning styles, and provide immediate feedback.

Engage students in learning

Few librarians would deny that instruction is more effective for students when it includes a high level of student participation. Students who are active partners in learning often show higher levels of comprehension and critical thinking (Browne & Freeman, 2000). In their instruction sessions, many librarians ask numerous questions and use hands-on exercises designed to involve and actively engage students. Even so, keeping the attention of many students is a challenge. Some students show signs of boredom by not following along, reading e-mail, sleeping or choosing not to participate in various activities. Reasons for lack of student interest vary. Some students think they already know what the librarian is sharing, and some of these students may be correct. This may not be their first library instruction session. Other students find the material dull and tedious. Students may come to a library instruction session with an interest in subjects such as history, music or literature but, unlike librarians, are often not interested in the strategies, methods, and mechanics of the research process.

Many librarians, during instruction sessions, ask students why they would use the catalog, where to go for periodical articles, or any number of library-related questions intended to involve students. Librarians often wait in vain for a student willing to volunteer an answer. Playing a game that contains an element of competition, during or at the end of the instruction session, is a way to motivate students who may be bored and uninvolved to join in. As McKeachie (1999) states, “the chief advantage of games and

simulations is that students are active participants rather than passive observers" (p. 180). During a game, students are not only willing to answer questions but are competing to do so. If a student answers correctly, he or she receives positive reinforcement. The game is not a formal quiz so the pressure of getting a grade is not present. The informal, non-threatening environment created by using games helps encourage student participation.

Review and reinforce material

In a very short class period, often less than an hour, librarians attempt to teach students a variety of very important concepts and skills, some more complex than others. For many students, it may be their first exposure to the Library of Congress classification system, OPAC, and online databases, as well as their initial foray into how to search for and evaluate material effectively. It is unreasonable to expect students to remember, let alone understand, information that may have been mentioned only once during the library instruction session. As previously noted, knowledge retention can be increased when using an entertaining game to review and reinforce material.

Librarians can use a game to organize the most significant material into categories, reinforcing concepts by providing an overall framework for the material covered in the library session. The game can help students make connections among and between the concepts and skills taught. For example, a category about the OPAC may question if a search for the title of a periodical article is possible in this database, while a category about periodicals may reinforce this same concept by asking what type of search would be done in the OPAC to locate a copy of an article, or perhaps where a student would search to find out if the library owned a copy of an article. Categories and questions should be developed with student learning outcomes for the session in mind,

and can be easily modified for subject-specific instruction sessions or general "introduction to the library" sessions.

Address additional learning styles

It is widely accepted that people exhibit various learning styles, defined by Kolb as accommodator, diverger, converger and assimilator and by Honey and Mumford as activist, reflector, theorist and pragmatist (Sadler-Smith, 1997). Educational research in the area of learning styles and learning preferences has been and continues to be undertaken in order to understand the relationship between a person's learning style (usually determined by a learning styles inventory or questionnaire) and preferred method of learning or instruction (Loo, 2004). Defined as "an individual's propensity to choose or express a liking for a particular instructional technique or combination of techniques," learning preferences range from teacher-centered and highly structured to collaborative and interactive, to independent learning using an instructor in a resource role (Sadler-Smith, p. 53). Because it is difficult to assess each student's learning style and corresponding learning preference and develop instructional methods and assignments that match these for each student, researchers have suggested that "educators use a variety of learning methods, rather than try to link specific learning methods to specific learning styles" (Loo, p. 107). Instruction librarians can do this by using a combination of instructional methods such as lecture, demonstration, questions and answer, and hands-on practice, in order to address as many learning styles and instructional preferences as possible. While this is certainly a good practice to follow, Oblinger (2003) suggests that the learning preferences of Millennials "tend toward teamwork, experiential activities, structure and the use of technology" (p. 38). The use of a game, therefore, may reach

this generation of learners in a way that other teaching techniques do not. For example, a student who has a difficult time retaining information presented in the lecture or hands-on component of the session, may have more success in learning information concepts when peers are giving answers, may learn more if he or she is part of a team that has to come up with an answer, or may understand information presented in the visual format of a game board more readily than the aural format of a lecture or independent learning format of a hands-on practice activity.

Get immediate feedback

A game is one instructional method that can provide students with real-time response, thus enabling them to gage how well they retained the main concepts presented in the instruction session. This immediacy of feedback is especially important to the Millennials who, having grown up in the age of 24x7 services, have little tolerance for delays and expect rapid feedback in their learning environments (Oblinger, 2003).

For the librarian, assessing an instruction session is always a challenge, partly because students often do not provide responses to questions librarians ask of them. In the authors' experience, introducing the "contest" associated with playing a game makes students more receptive and willing to answer questions. By observing the number of students who attempt to answer a question, the instructor can get an impression of how many students know or are confident that they know the answer. If only one or two people try to answer, the concept may not have been understood by the group or elucidated effectively by the librarian. Instructors can then take a minute and give further explanation. Thus, the game helps identify a point that was missed or was unclear when discussed earlier in the class.

While there are more quantitative, formal means of evaluating an instruction session, using a game either during class or as an after-class activity can help the librarian evaluate if students have met the learning outcomes for the session. However, if the game requires written answers from a group or individual, the instructor can more easily measure the success of the session. Librarians can use this valuable feedback to modify and improve future instruction sessions, perhaps trying a different method to teach the information, using a new analogy that may help students understand a concept better, or reorganizing the structure of the session.

Generate good library public relations

Librarians continually battle various stereotypes including the librarian as a serious, rigid enforcer of the rules. The commercially available librarian action figure complete with push-button "shushing action" is a recent example of this stereotypical portrayal of librarians. Stereotypes can be neutralized when librarians interact one-on-one with students at the reference desk or during a research consultation; however, it can be more difficult in a larger, more formal instruction session. Using a game in a classroom setting is one way librarians can appear approachable, flexible and willing to have fun. A game provides the opportunity for both students and the librarian to interact in a relaxed and entertaining way.

Keep instruction lively and fresh for students and librarians

Librarians teaching an instruction session are often asked to provide a large amount of information in a very limited amount of time. Working within these constraints often requires a well-organized presentation that uses time efficiently. A structured presentation may seem to limit the freedom or amount of spontaneity that can

be accommodated within a class. Including a game or activity in class allows for some "planned spontaneity" within this structured environment. Also, while some librarians love being in front of people and have even entertained thoughts of becoming a standup comic, many librarians were not born entertainers or public speakers. Librarians may not be comfortable telling jokes in front of a classroom of students, but most can be successful as a host of an in-class game. The librarian does not have to be a master of improvisation since the game is prepared prior to the class. Leading a game and enjoying oneself—smiling and laughing—is a way to lighten up the presentation of the material, for both the students and the librarian. Often students seem to remember the last thing done in the class, and if it was a game, it should have been a positive, pleasurable experience for everyone.

Jeopardy-style game

At Georgia State University Library the majority of library instruction takes place during one class session, usually fifty minutes in length. Looking to engage the interest and attention of the Millennial generation of students and capitalize on research findings that show students find games more interesting than traditional classroom instruction techniques, library instructors developed a Jeopardy-style game to use in one-time library instruction sessions. While this game is similar to the television Jeopardy, the format is not exactly the same. Among other things, students do not have to provide answers in the form of questions. The game board is a web page projected on a screen, consisting of a simple table with the top row identifying the categories and additional rows for point values (http://www.library.gsu.edu/jeopardy/music/). The point values are hyperlinks that reveal the questions when selected. The questions are read aloud, and the student

who raises his or her hand first is selected to answer. Although the librarian can read the questions and oversee the game, the instructor who has brought the class to the library can assist by identifying the student who responds first. Depending on how the librarian chooses to conduct the game, students may accumulate points for themselves or for their team. The points can be recorded on the blackboard by the instructor who brought the class, or a student volunteer. While the game board and scoring can be accomplished with more advanced technology and programming, this simple web page format allows librarians to construct the game, and easily edit and customize the game board for different classes. See Appendix A for examples of categories and questions from a Jeopardy-style game created for an instruction session on music resources.

In addition to this simple web page format, a template for a similar online Jeopardy-style game has been created by the University Educational Technology Services (UETS) at Georgia State University. This Jeopardy-style game along with other games can be downloaded free of charge for educational use (http://www.gsu.edu/~wwwets/instructionalsupport/learningobjects/finding.html). Although the Jeopardy-style game template developed by UETS is easy to use, the template has a fixed number of categories and questions per category. The University Library programmer has created a similar Jeopardy-style game using ASP (Active Server Pages). Currently, Georgia State University librarians are working with the programmer to develop a template that allows librarians to alter the content as well as the number of categories and questions. An example of the game board is available at: http://www.library.gsu.edu/jeopardy/ (game: library password: trebek). Whether you are developing and constructing a game yourself or collaborating with others, particularly

those with technical expertise, the following tips are useful points to consider in the creation and implementation of a game.

Design the game around learning outcomes

Choose the game or activity that will address the learning outcomes sought, and design the game around them. Several cognitive learning outcomes can be achieved when playing a game, including declarative knowledge, procedural knowledge, and strategic knowledge (Garris et al., 2002). The Jeopardy-style game aims to address two of these three learning outcomes in the following way. Students who are able to answer a question that requires knowledge of facts given during the library session (for example, where the current print collection of periodicals is located in the library) demonstrate declarative knowledge. Students who can correctly answer questions that ask how to perform a task (for example, how to use Boolean operators to search an online database) demonstrate procedural knowledge. Strategic knowledge, which signifies that students will be able to use facts learned to create new cognitive strategies, is not a measurable learning outcome for this particular game, although it is a learning outcome for the whole library session. A more sophisticated game such as a simulation of a research problem that requires students to apply the declarative and procedural knowledge they learned from the instruction session in order to successfully complete the simulation game, would be an example of how strategic knowledge could be integrated into a game. Finally, the Jeopardy-style game aims to produce two affective learning outcomes for students, that is, after the game students will feel more confident using library resources and will have an overall positive attitude toward the library and librarians.

Most often, library instruction games are used to reinforce material covered in a library instruction session or as a test of student knowledge. If you want the students to read and review main points, try a find-the-word game where students read a sentence, such as "*Boolean* searching involves using one of the terms AND, OR, and NOT to connect search terms," and then have to find the term in italics. Since the activity does not require the students to come up with an answer, it does not test knowledge, but it does reinforce what has been covered. Other games, such as a crossword puzzle, could use the same sentence as the clue leaving out the term [Boolean], "_____ (7 letters) searching involves using one of the terms AND, OR, and NOT to connect search terms," and would test student recall and knowledge. The game reinforces the information covered in the instruction session and could be used to evaluate, post-session, what the students learned.

Keep it simple

This mantra applies to many aspects of instruction including using games. As mentioned earlier, the time allotted for a library instruction session is often quite limited. Various games can be incorporated into a session without having to eliminate a significant amount of material if the game is kept simple. Therefore, the game should not be difficult to explain or to execute. Adapting or borrowing from a game with which most students are familiar reduces the amount of explanation required. The television show Jeopardy is so well known that after a few brief words to explain any alterations to the rules you can "let the game begin." One alteration, having the librarian select the questions rather than allowing students to make the choices, allows the librarian to control the pace of the game and significantly reduces the amount of time needed to complete the activity.

Adapt and customize

In the case of a Jeopardy-style review game, the categories and questions should reflect what has been covered in the library instruction class. Needless to say, if students are asked questions in the form of a game the librarian must make sure to get through the material during class. Again, this emphasizes the importance of being organized and following an outline. Librarians can also adapt and customize the way the game is conducted so that it is a systematic review of the material. Having the librarian choose the questions allows for the librarian to control the flow and direction of the questions. The librarian can move from general to more specific questions and have the questions build on ones that were asked earlier. Allowing students to choose questions at random would destroy the flow and development of the review and some of the questions may not make sense when asked out of order.

Georgia State University librarians who use the Jeopardy-style game have adapted it for various class settings. Often the class is divided into teams that work together to supply the answers. In classes where there is time, a question is given and all teams supply an answer in written form. The answers are collected and all teams with the right answer are awarded points. This option allows students to discuss the questions and collectively come up with the answers. If the time available for a game is limited, the class can be divided into teams and the first person to answer gains points for their team. The students are still working together, but there is not a designated time for discussion. Students answer quickly and the game can be completed in a short amount of time. These are just a few examples of how games can be altered to meet the needs of the class and the time available.

Expect the unexpected

Every library instruction session is unique. Regardless of how many time you may have taught a session on a particular topic, you must be prepared to address the distinct needs and challenges of each class. If you are using a game that requires online access you must be prepared if the online game is not functioning properly. Having a printed version of the questions and answers is always a good strategy, as is having an alternate activity that could be used in place of the game. Besides the unexpected technological glitches, you must also be prepared for the unique reactions or responses of the students. What if no one is excited about participating? If you are waiting for students to raise their hands and no one is volunteering try breaking the students into smaller groups and have them discuss a question and come up with an answer. Another scenario might involve a student who is dominating the game by always being the first to respond. In this situation you could adapt the rules so that when a student answers a question he or she is not eligible to answer the next question. In the authors' experiences, altering the rules during the game has not had a negative impact on students' willingness to play the game.

While intended to encourage some competition, a game should be a positive experience. If an overly zealous student makes inappropriate or disrespectful comments regarding the librarian or other students, the librarian should be prepared to address the student with a suitable response. Regardless of the activities used during an instruction session, librarians are responsible for maintaining a constructive learning environment.

Conclusion

The instruction librarian should select, adapt and direct the game so that it is enjoyable for the students but also has a definite purpose and defined learning outcomes. If the goal is simply to have a good time, the students can do that outside of class. The overall objective of using a game is to provide students with knowledge they will need for a class assignment and future library or lifelong research. The game is a tool that allows students to have fun and learn at the same time. While librarians take their instruction responsibilities seriously, the tools or activities used do not need to be viewed by students as "serious." Librarians need to take advantage of a variety of instructional methods, including the use of games, to engage students so they achieve both cognitive and affective learning outcomes.

Appendix A: Jeopardy-style game categories, questions and answers

Category	Points	Statement	Answer
Library Home Page	200	Not at all "fishy" this is the GSU online catalog used to find books, sound recordings, videos, etc.	GIL
	400	A group of databases shared by all colleges in Georgia (also the name of a great astronomer).	GALILEO
	600	Go here to find all databases available through GSU.	List of Databases
	800	In addition to searching GIL for journal titles, go here for a listing of electronic journals.	e-journal Locator
	1000	On the library home page select this link to get to web pages for this class.	Research Guides
GIL (OPAC)	200	In addition to books, 2 other types of materials you can find using GIL.	Sound recordings, Videos, Scores
	400	Probably the most common type of search to find books on a topic.	Keyword
	600	To search for a known item such as title, journal title or subject heading, do this type of search.	Exact
	800	The truncation symbol in GIL: placing this after the root of a keyword such as music will search music, musical, musician.	Question mark (?)
	1000	Select this option to limit your search to sound recordings, scores or video recordings.	Narrow My Search
Databases & Indexes	200	True or False – Electronic databases make it unnecessary to use print resources.	False
	400	More of an encyclopedia than a dictionary, this online source is one of the first places to go for information on a music topic.	New Grove Dictionary of Music & Musicians
	600	Use periodical databases or indexes to find this.	Journal articles
	800	Many indexes provide a summary of the article, also called this.	Abstract
	1000	These are two subject-specific databases for music.	RILM, Music Index, IIMP [any 2]
Library "Lingo"	200	Boolean searching refers to these 3 words to narrow or expand a search.	And. Or, Not
	400	Journals are also referred to as this.	Periodicals
	600	Information such as Author, Title, Publisher, etc. is part what you need to find an article, also called this.	Citation
	800	This term refers to adding a symbol (?) or (*) to the root of a word to search multiple forms of the word.	Truncation
	1000	Journals that are peer-reviewed are also referred to as this.	Scholarly

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