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While video games have been around for decades, the academic study of video games and their creation is fairly recent. Academic programs in video game design blend artistic and technical prowess with a knowledge of the field to train future creators of this form of entertainment. This study investigates the information behavior of a group of 11 video game design undergraduates at one academic institution utilizing focus group interviews and qualitative analysis. Major findings include their need for technique and how-to information related to computer programs such as ZBrush and Unreal Development Kit as well as a need for inspiration and specific visual references. These students rely heavily on web and social resources for troubleshooting assistance and to stay updated about new developments or artists in the field. From the findings, suggestions are made for academic librarians to collect and serve this unique user group.

Headings:

Information needs

Academic libraries

Video game design

Students

THE INFORMATION BEHAVIOR OF VIDEO GAME DESIGN
UNDERGRADUATES

by
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INTRODUCTION

For many years after their introduction in the mid-twentieth century, video games have been labeled both good and bad for society (Gee, 2007; “The impact of interactive,” 2000). Nevertheless, they have become a popular form of entertainment. In 2010 the video game market earned more than \$25 billion in revenue; \$15.9 billion of which was actual video game content. These numbers are not surprising considering 72% of American households are playing electronic games (Entertainment Software Association, 2010).

Librarians have recognized the popularity and potential educational merit of video games and have suggested including them in library collections (Buchanan & Elzen, 2012; Mastel & Huston, 2009; Squire & Steinkuehler, 2005). As their popularity increases, so does the need for professionals who create these games. In the United States alone, there were over 500 academic video game programs as of 2009 (Mastel & Huston, 2009). These new academic programs create new user groups for librarians to serve (Kane, Soehner, & Wei, 2007; Laskowski & Ward, 2009; Robson & Durkee, 2012; Smith, 2008; Trappeiner & Lyons, 2008). However, literature is lacking a proper information behavior study of game students in order to understand how these students seek information and with what research methods, materials and formats they are most comfortable (Smith 2008).

The fields of library and information science and video game studies would both benefit from a qualitative look at the information behaviors of this new group of interdisciplinary undergraduates. The purpose of this study is to determine:

- The information needs of undergraduate video game design students
- The resources and research methods used by undergraduate video game design students.

This paper will first describe the typical curriculum of an undergraduate video game design program. Secondly, the information behavior of professional and student artists and computer scientists will be reviewed. The methods section will explain the process of conducting focus group interviews with these students. Finally, findings and implications for academic libraries will also be presented.

VIDEO GAME DESIGN

Video game-centric academic programs focus on the general study or the creative or technical processes of creating video games. Many institutions offer a hybrid degree where students leave with theoretical and practical knowledge of video games and how to create them. “Video game design,” involves students acquiring and applying knowledge of the arts and technology and how the two can be used towards the same goal.

Academic institutions that offer degrees in video game design, or a derivative of, offer either a Bachelor of Arts, Bachelor of Fine Arts, and/or Bachelor of Science depending on the amount of fine arts and computer science focused classes offered. While there is no official accreditation for institutions, the International Game Developers Association (IGDA) has created a curriculum framework for institutions to consider when creating their programs. The latest version articulates a difference

between “game design” and “game development” (IGDA, 2008). “Game design” encompasses player-centric principles, concepts, and practices that go in to the creation of a high quality game product while “game development” focuses on the production of games as an interdisciplinary collaboration between the arts and technical disciplines and involves project management work. Judging from the various video game focused programs across the United States, “game design” and “game development” are often combined and labeled as one or the other. For the purpose of this study, “video game design” will be used.

IGDA suggests nine core topics for the study of games: critical game studies, games and society, game design, game programming, visual design, audio design, interactive storytelling, game production, and business of gaming. There is an understanding that many elements within each topic overlap.

Most of these topics are self-explanatory, with institutions offering coursework in each topic. “Game design” and “game programming” are the most abstract, yet integral to understand in order to understand the field. Game Design is split between “conceptual” and “practical” approaches. Conceptual game design deals with a number of the aspects of the ways in which games work. Among these foundational ideals are rules and mechanics, the precept of looking to traditional role-playing games and board games for inspiration, and turning ideas in to practices. There is also focus on feedback, interactions, and simulations as abstract design elements; rewards, social systems, and addiction as psychological design elements; and elements like controls, hardware, and computer user interface theory as interface design. Practical game design involves spatial concerns, a focus on task-oriented activities, and how the two can be interwoven; control

schemes; player training; game tuning; play testing; player analysis; and game platform issues. Game programming calls upon skills in physics and math often utilized in a computer science degree with information design, game engine design, design and technology synthesis, graphics rendering and animation, artificial intelligence, and networks and game logic.

These programs usually provide coursework in many of the core topics mentioned such as narrative, music and sound design, character design, game usability, programming, artificial intelligence, environment and level design, modeling, interactive design, game mechanics, interactive entertainment, user-centered design, and more. These courses are often a mix of artistic and technical. There are also courses that involve the study of the history of games and the video game industry. Some courses are built around specific types of video games, such as mobile games and online multiplayer games. Most programs require a capstone course that involves creating an entire game.

ARTS INFORMATION BEHAVIOR

The arts play an important role in the field of video game design. The information behavior of art students and practicing artists has been popular over the years due to their unique information needs and information-seeking behaviors. Hemmig's (2008) literature review resulted in five categories, later built upon by Mason and Robinson (2011), of the information needs and other patterns in the literature. These provide the structure for this literature review.

Artists most often seek information for inspiration (Cobbledick, 1996; Hemmig, 2009; Layne, 1994; Littrell, 2001; Pacey, 1982; Stam, 1995a, 1995b; Toyne, 1977; Visck, Hendrickson, & Bowman, 2006). Cobbledick (1996) defined inspirational material best

as something that provides motivation or serves as a “catalyst in creation of art (348).”

Dane (1987) mostly focused on how the broadness of a public library’s collection is better for artists because of their need for a variety of available information.

Individual needs of artists are wide-ranging and often have nothing to do with what is commonly related to art (Cobbledick, 1996; Dane, 1987; Day & McDowell, 1985; Ferguson, 1986; Oddos, 1998; Pacey, 1982; Stam, 1995a, 1995b; Toyne, 1975, 1977; Trepanier, 1986). Artists can find inspiration in poetry, philosophy, cultural history, fiction, religion, social sciences, and psychology (Dane, 1987). Toyne (1977) uses the example of students with strange requests such as the lifecycle of an insect or the particular design of a train. As odd as these requests may be, one can see their influence in the resulting work.

Artists often have needs for “specific visual elements” (Cobbledick, 1996; Day & McDowell, 1985; Frank, 1999; Hemmig, 2009; Layne, 1994; Pacey, 1982; Phillips, 1986; Stam, 1995a; Visick et. al., 2006). Frank (1999) found that art students seek specific art reproductions, technical illustrations, graphics, clip art, and photographs for reasons varying from inspiration to discovering how to do something.

This is linked to artists’ need for information about materials and techniques (Cobbledick, 1996; Dane, 1987; Frank, 1999; Hemmig, 2009; Layne, 1994; Oddos, 1998; Stam, 1995b; Toyne, 1977; Visick et. al, 2006;). Toyne (1977) and others consider this to be “how-to” information, which can be anything from manuals to images of a process. Mason and Robinson (2011) include personal experience and advice from others in this category, which is connected to another pattern realized by Hemmig (2009): the importance of social information gathering (Cobbledick, 1996; Dane, 1987; Hemmig,

2009; Nilsen, 1986; Oddos, 1998; Toyne, 1975; Visick et al., 2006). Artists often utilize neither print nor electronic sources for their information needs. Hemmig (2009) found that two out of the three top technical information sources, as well as the top half of the marketing resources involved social information gathering.

Marketing and career information is another purpose for which artists seek information (Cobbledick, 1996; Dane, 1987; Hemmig, 2009; Pacey, 1982; Stam, 1995a, 1995b). For practicing artists this is an especially important information need as many attempt to make their living from their artwork. Hemmig (2009) found that artists get much of this information from art magazines and through social contact with galleries and buyers.

Current art world trends were found to be a common information need (Challener, 1999; Cobbledick, 1996; Day & McDowell, 1985; Nilsen, 1986; Pacey, 1982). While Hemmig (2008; 2009) recognized this pattern, he argued that there is little difference between it and obtaining inspiration or how-to and career information. Mason and Robinson (2011) found that illustrators and fashion and textile designers were more likely to say they have been inspired by current trends.

Browsing was found to be a preferred method for information seeking by artists (Day & McDowell, 1985; Ferguson, 1986; Frank, 1999; Hemmig, 2009; Littrell, 2001; Pacey, 1982; Phillips, 1986; Stam, 1995a, 1995b; Toyne, 1977; Trepanier, 1986). Cobbledick (1996) and Visick et. al. (2006), however, found that artists do have a specific need in mind while browsing. This phenomenon is known as directed or specific browsing (Apted, 1971; Herner, 1970).

Mason and Robinson (2011) noticed an issue in the literature with the type of resources needed and used and library usage. There has been little agreement on what format of resources artists prefer other than the fact it varies from text to image to multi-media. There is little about artists' use of the internet due to the dates of most of the literature, but several studies found online resources to be of the utmost importance (Gregory, 2007; Koopmans, 2009; Mason & Robinson, 2011; Van Zijl & Gericke, 1998; Visick et al., 2006). Due to the variation in formats and types of information used, some argued that public libraries support artists better than a specialized art library (Dane, 1987; Ferguson, 1986; Oddos, 1998). Hemmig (2009) found that 75% of the practicing artist respondents had used public libraries in the past six months compared to the 40.9% who used other types of libraries.

Cowan (2004) noted the overall focus of these studies on library-centric information behavior. Part or all of many studies focus on how artists or art students use the library as a part of their information behavior (Bennett, 2006; Dane, 1987; Frank, 1999; Gregory, 2007; Littrell, 2001; Mason & Robinson, 2011; Nilsen, 1986; Pacey, 1982; Reed & Tanner, 2001; Stam, 1995a, 1995b; Tonye, 1975, 1977; Visick et. al., 2006). Not all artists and art students use libraries. Focusing on library usage could alienate those that LIS professionals are trying to help most.

In summary, artists and art students need information for inspiration, "specific visual elements," technique and materials, marketing and career purposes, and current art trends. They employ browsing and need information not usually known as art information. Their widely-ranging interests can mean that they would benefit from the scope of a public library versus a specific art library. Recent studies show they heavily

rely on the internet and electronic sources. The studies of artists and art students often focus on how these users use a library instead of their general information behavior.

COMPUTER SCIENCE INFORMATION BEHAVIOR

There is little to be found in LIS literature about the information behavior of computer science students or professionals. Tucci (2011) investigated the information-seeking behavior of computer science and engineering faculty members to gain an understanding of this group and to better serve them in their library. These faculty members were found to utilize online library resources and to value and use online journals more than books. Accessibility was imperative and they were dissatisfied with a lack of subject-specific databases the library had to offer. Tucci also found that there was a lack of communication between the librarians and the faculty, such as how interdisciplinary research was occurring between the computer science department and the interactive media studies department on gaming theory.

Saad and Zainab (2009) explored the information behavior of computer science and information technology undergraduates as they completed their final projects. Students were found to use Google and to utilize databases and advanced searching methods. They believed that books, especially those recommended by their professors, were reliable resources. However, they encountered problems with their library not having all the titles needed. Students did not widely use library resources due to the inconvenience of time and place. The online databases could only be accessible from on campus, the students felt that the library did not offer useful resources for their projects, and the students did not feel comfortable asking for librarian assistance even though it

was encouraged. Students were found to be dependent upon the information gathered from social interactions with their peers and professors.

Both of the computer science information behavior related studies here found that these individuals value access and were dissatisfied with their libraries for this reason. While the findings may not be applicable to all computer science students and professionals, they may be able to provide connections to the information behavior of video game design students.

VIDEO GAMES IN LIBRARY AND INFORMATION SCIENCE

The current literature in LIS that deals with the field of video games mostly focuses on how to collect them based upon faculty suggestions, overall public and critical reception of the games, and other video game collection literature. Trappeiner and Lyons (2008) created video game selection criteria based on other academic libraries' collection development policies that focused on physical characteristics, teaching and learning opportunities, subject content, and the "cultural and historical value of games" (121). Kane, Soehner, and Wei (2007) discussed the creation of a focus group of librarians and staff in order to design a pilot project to build a video game collection and lab of computers and gaming consoles for a new Computer Game Design program at the University of California-Santa Cruz. The focus group received requests for specific video games from faculty.

Several academic libraries have begun to collect new types of games and new elements of the console games. Robson and Durkee (2012) discussed their creation of a gaming collection development policy at the University of Texas that reflects the changing nature of the field. The decision to collect more than just popular console

games came from the creation of new courses that “investigate the broad cultural meanings of video gaming” (81). This included beginning to collect artistic games created as ways to explore the medium, serious games created for educational purposes, and independent games designed for commercial reasons or by small companies for the sake of being created. These games are often played on computers, handheld devices, and within browser-based environments; mediums for which collecting had not been done before.

Laskowski and Ward (2009) urged other librarians to begin to collect and understand video games for research and as education tools. A faculty member who was a well-known gaming studies researcher provided input from a faculty perspective, created student gaming groups, and implemented a student survey about games and their uses for the classroom. They believe a successful and useful collection includes not only the games, but also additional hardware, labs that can accommodate an instructor-led gaming session, and “repositories to store games, simulations, and actual gameplay (272),” such as alternative endings and interactions not seen every time the game is played.

Smith (2008) provided a guide for librarians that are beginning to collect for this user group and discussed the need for development in reference, instruction, and collections. Smith observed the lack of research of the information-seeking behavior of these students that is needed in order to understand how to serve and collect for this group.

To date, LIS literature dealing with this field focuses on collecting video games based upon popular and faculty opinion. They are often collected for general academic

programs as well as video game studies programs. An information behavior study of video game design students would be useful to provide more information about what resources they use and would better suggest how to collect for them.

METHODS

For the purpose of this study, “information behavior” will be used as an all-encompassing term to cover information needs and information-seeking behavior, both “functions of [a] broader task or problem situation (Vakkari, 1996, 457).” “Information need” will be used to describe a conscious or sub-conscious lack of information that cannot be met without a form of outside assistance. “Information-seeking behavior” involves the action or set of actions that follow the realization of an information need or a gap in ones knowledge. This may include actively seeking through a personal strategy or the unintentional encountering of the needed information. Within this study, “information universe” will be used to compliment “information behavior” to describe the resources available to and used by an individual as well as the methods used in order to fulfill an information need. This idea is similar to “information horizon,” which specifically deals with the context and variety of resources available to an individual (Sonnenwald, 1999). It is also similar to “information world,” the “point where information behavior intersects with social contexts, economic factors, [and] political and legal structures...” (Burnett & Jaeger, 2011, 173). Information universe is used considerably less than information behavior, but other researchers such as Shenton and Dixon (2003) used it for similar research goals within their user groups. The specific information universe context of video game design students that will be explored in this study is their academic

information universe, as this will be most helpful when trying to apply the results to an academic library or other academic information center.

In order to discover the information behavior and information universe of video game design undergraduates, focus group interviews were conducted involving a total of 11 video game design students from one academic institution. Focus groups provide a social opportunity to engage in “previously taken for granted discussions” (Bloor, Frankland, & Robson, 2001, 5-6). Wildemuth and Jordan (2009) suggest the use of focus groups for many elements of LIS research, including information-seeking studies.

The 11 participants were recruited through a mix of convenience and snowball sampling. The researcher had a personal contact in the program that passed along a recruitment statement and contact information through the program’s Facebook page and by word of mouth. This is also known as recruitment via an intermediary (Bloor et. al., 2001). One student was approached the day of the focus group interview by the researcher and invited to participate. Using a pre-existing group, in this case friends and classmates, brings an element of shared experience to the discussion that would not be possible with a group of total strangers (Bloor et. al, 2001). The only requirement for participation was that the individual was a student at the institution’s video game design program. Two separate focus groups were scheduled during a single weekend and took place in the building where most of the students’ classes were held. The first focus group included six students and the second one had five. A sixth person had planned on attending the second focus group but did not attend. According to Greenbaum (1993), these are considered minigroups. Both focus group discussions were structured by the two overarching research questions:

1. What are the information needs of video game design undergraduates?
2. What resources and research methods do they use?

and further divided by their academic and professional needs, methods, and resources.

Similar information was sought from Latrobe and Havener's (1997) study of high school honors students and Day and McDowell's (1985) study of art and design students. The approach of structuring interviews on research questions has been used in similar art information behavior studies (Cobbledick, 1996; Koopmans, 2009). Cobbledick (1996), for example, structured interview questions on the "processes that place the finished work of art in a community and the creation of the work of art itself (348)" divided by technical, visual, and inspirational information needs. She additionally asked about libraries, books, technology, and keeping up with new developments in the art world.

Participants were handed an information sheet before the discussions started that explained the research and the rights as research participants. Each session began with basic introductions of the participants including first name, year, and their focus of study for the benefit of the researcher at the time and to be able to refer to voices while analyzing the recordings. The researcher then asked if anyone would demonstrate or explain a recent search or information need they experienced for a class assignment as a type of focusing exercise (Bloor et. al., 2001). This provided an active way for the participants to understand what the researcher was interested in and both groups promptly carried the discussion along afterwards. A copy of the focus group interview guide can be found in Appendix A. The focus group interviews were recorded.

FINDINGS

The focus group recordings were analyzed and coded for emerging trends using NVivo 10. Special attention was paid to the research questions. The researcher also kept an open mind for emerging trends and noted any correlations between the responses and the findings of the literature reviewed in the previous chapters.

Students are denoted by a number and letter. The number represents the focus group and the letter represents the student within that group.

Student 1A is a senior focusing on design and character and concept art. Student 1B is a junior focusing on design, two-dimensional art, and independent, or “indie,” games. Student 1C did not note his class but focuses on design and producing. Student 1D is a senior focusing on systems design and programming. Student 1E is a senior focusing on design, programming, and pixel games. Student 1F came in late and did not introduce himself on the recording. Student 2A is a senior focusing on narrative and system design. Student 2B is a senior level artist. Student 2C is a senior programmer. Student 2D is a senior environment artist. Student 2E is a senior concept artist.

Most findings were said by one or two individuals but followed by visual and audible agreement from other participants in the focus group. Differing opinions were stated and further information was often requested from other group members so they could find out about the resource or method mentioned.

What are the information needs of video game design undergraduates?

The information needs of the participants are directly related to their assignments that are related to the software and programs used to create video games and elements of them. The fact that their institution operates on a quarter system came up in the

interviews regularly. Only having 10 weeks in their courses creates a sense of urgency for their assignments.

Early coursework in the degree involves students creating items with specific programs and software. Adobe Illustrator and Photoshop, Maya, Unreal Development Kit, and Zbrush were specifically mentioned. Maya is 3D animation software, Unreal Development Kit (UDK) is a game development tool, and ZBrush is a digital sculpting and painting program. For example, an assignment in the modeling course was to make a hard surface model in ZBrush. Information needs related to these predominately technical courses are mostly how-to needs, specifically how to use these programs. Student 2E said that professors follow a pattern in these courses: lecture, demonstrate the program in class, and give an assignment using the program. They do not go in to immense detail or techniques, so students must solve this need themselves. Student 2E said that her information searches are most often for technique. Student 2C said, “to be good, you have to be self taught.” Student 2D believes that the professors only care about the end result, while how you get there is most important when you are producing for a company. These students are put into situations where they must go beyond what is given to them in class in order to believe they can succeed later in the field.

Student 2D stated a strong desire for industry standards for deliverables such as texture size and smoothing groups for models, as their professors do not give “practical” constraints like they would experience in the field. The students have an overall need to feel prepared for the reality of working in the video game industry, whether it be by working with industry standards or needing to feel like they are capable of expressing themselves in the medium of video games.

Both focus groups described a need to have something to reference while creating. Both mentioned the usefulness of having a similar completed file of what they are doing, such as a Photoshop document (PSD), available. Having it as a PSD instead of the PDF they normally see when looking at a final image allows them to see the individual layers and attempt to understand the creator's method. They take this information and apply it to their own creation. Knowing how a video game approached something like fire is a common information need. Student 2B brought up the idea of a "texture resource," as the artists among them have a constant need to find high quality images of obscure things like dead leaves that they could refer to when creating textures in games. Student 2E supported this idea as a source for reference.

Assignments in a game criticism course required students to create board games. One assignment was to make a board game with particular game pieces that involved collaborative play and would last at an hour. Students 1A, 1C, and 1D pointed out how this project exemplified an overall need to find out how to work within constraints to make a unique game. Student 1E said specific assignments like this are practices in problem solving, among other things.

A common need among the participants is quality video game footage. Specific needs are usually of a particular game or element of any game. For a virtual environment course, Student 2B had to do a 30-minute presentation on dreamscapes and needed video examples of dreamscapes in video games to show.

One assignment mentioned was to present on a currently defunct video game company. While specific information needs for this were not mentioned, one can assume that it was accurate information.

Eight out of the nine participants that stated their class rank were seniors, so most of their recent and current assignments have been to create video games. Information needs related to these projects include all of the above as the programs and skills that they were learning are all used in the creation of a game. While group work seems to be common in most of the classes, working as a group to create a game brings up new information needs. Skills in project and people management are required. Random, incidental information is needed when creating a video game. Student 2A discussed a need for accurate marketing information to assist in deciding what type of game to create for what user group.

Specific game creation assignments, like making a randomly generated game, create broad how-to needs. They are faced with the questions of how to make a particular type of game, how to do an in-game mechanic or build a character to solve a problem, how to make a puzzle, and how to do something new with the narrative, characters, textures, or programming code. In this case, the how-to needs are often interpreted by the participants as needs for specific inspiration.

Students 1C and 1E mentioned difficulties with determining what they wanted to focus on as students. Student 1C began his studies as a fashion marketing and management student, and then moved to animation, then to video game design focusing on character design and concept art. He believed his skills were not as high as others in this area and discovered how much he enjoyed designing games and working with those who do, so he has taken on a producer role. While it took him a long time to get here, he appreciates the fact he has experience in almost every area of game design so he can empathize and understand what the others are going through while making a game.

Student 1E knew he wanted to design games, just not what kind of games. He noted that until you actually make a game, certain factors of the process do not come up. While similar behaviors are found in students of any field, it is important to note that video game design students also experience this uncertainty.

Participants agreed that their professional information needs are directly related to their academic information needs. Although it was not mentioned explicitly by any one, there is an unspoken need to be kept up to date in the field. Students feel that they must never be caught off guard by a new game or designer. Student 2E stated a need for up to date information as the industry changes so quickly.

Similarities to art

Assignments in this video game design program appear to be specific as to what kind of product is delivered. Overall the students have creative free reign on exactly what is being produced, much like traditional artists. Like artists, these students often need information on technique and other how-to problems. Their need for inspiration is not verbalized as much as in studies of traditional artists and art students. This need takes many other forms such as a need for a video of a game or a need to find ways to make a puzzle. They also have needs for “specific visual elements” that can be as general as fire or as specific as fire in a particular level of a game. Similar to artists, these students have a need to stay knowledgeable of the industry. Their strongest needs have to do with feeling prepared to work in the video game industry. This focus is similar to the needs for marketing and career information of artists.

What resources and research methods do they use?

To solve their information needs, video game design undergraduates are dependent upon web resources, video games, and their social contacts combined with their troubleshooting skills. They also periodically use print materials and other resources.

Web resources

The students are heavily dependent on web resources when attempting to solve their information needs. Both focus groups implied that they have a daily routine of browsing websites to build on their knowledge of the industry. The websites mentioned include: Gamasutra, a game industry news website focused towards those in the industry, Kotaku, a popular website for players with video game news and reviews, and Polycount, a forum for game artists. Everyday, Student 1D reads the first paragraphs of articles on Gamasutra and files the potentially useful ones in relevant folders. He refers to them when he has a related information need. Kotaku is valued for its player perspective as mentioned by Student 1A and 1D. Student 2D uses Polycount to get daily updates on new modelers or techniques. This is his way of keeping up with developments in the field. Gamasutra and Kotaku are not resources that are usually sought after for specific assignment related needs, but they serve as important resources to build the student's knowledge of the industry. As Polycount is a forum, it serves multiple needs that will be discussed later.

Kickstarter is a website that allows individuals or groups to post their ideas for games, businesses, etc. and to request funding. It was mentioned by Student 1A as useful to browse for inspiration. The ability to see and consider why projects have achieved

their financial goal, surpassed their asking amount, or failed was mentioned specifically by Student 1B.

Social media is used by a couple individuals as a resource to fulfill various information needs. Student 2E found the institution's program Facebook group to be useful for inspiration and keeping up with the industry. Students often post items they find interesting onto the group page. Student 1C posts Facebook status' asking for advice, particularly about types of games he is unfamiliar with. Student 1B utilizes Twitter to encounter information by following individuals in the game community. Student 1E used Twitter to track discussion about a game he recently created and uploaded to Flashportal, a website for flash games. These findings provide interesting examples of how social media is not just about wasting time and useless information.

Both groups cite Lynda.com as a first stop when learning how to use a new program. Lynda.com is a website that their institution subscribes to that provides tutorial videos for thousands of programs. For troubleshooting with particular programs, they consult their help websites. ZBrushCentral not only provides a FAQ section but also serves as a platform for users to ask others questions and work through their issues in a forum atmosphere. Students 1D and 1E work with a game engine called Flixel and consult the community forum built around it for assistance. UDK has the Unreal Developer Network (UDN) that provides tutorials, but Students 2C and 2E lamented on its lack of actual troubleshooting assistance. They believe that with UDK, Google and other people's blogs are the best resources. Students 1C and 2E usually take their questions directly to Google. Successful searches link to discussion boards, forums, or blogs where other people are discussing the problem and how they solved it. Student 1D

goes to Google first, even if he knows what website will likely come up, because the search will either take him right to the part of the website he needs or show other useful websites. Several participants noted their heavy usage of Google.

Piecepack was cited by Student 1C as a resource for the board game project. Piecepack is an open source board game system comprised of parts that can be adapted to any rules or context chosen by the creator. The website explains their pieces and tokens and provides access to board games that have been created with this system. This served as a means of reference and inspiration for the students working on the assignment.

Those that consider themselves game artists consult ConceptArt.org, DeviantArt, and Polycount for how-to assistance, reference, and inspiration. DeviantArt is a general art forum while ConceptArt.org focuses on concept art. Artists sometimes post all of their work on these forums, which is known as an “art dump.” The students, due to their interests in preparing for the industry, seek professional art dumps. This is a popular use of Polycount. Professional art dumps provide a way for them to see the results of professional standards. Student 2A enjoys browsing ConceptArt.org for inspiration despite his interests in other areas of video game creation.

SafariBooks, an online resource provided by the library, was mentioned by Student 2C as a good source for books on programming. She specifically noted its usefulness for an iOS programming course.

VGChartz is a website that compiles publically available video game sales information. Student 2A, who discussed a need for accurate marketing information, mentioned this as an untrustworthy resource. Fact checking and his own personal knowledge of video games and the game industry led him to this conclusion.

Student 1C uses TVTropes to avoid generic story lines in games. TVTropes is an online encyclopedia of common storylines and plot twists in fiction. This speaks to the need of wanting to do something new and different, particularly with story and characters.

While group 2 discussed a need for a texture resource, Student 2D said that GameTextures.com provides various textures to download to use but feels strongly against it. He believes that as an artist he is supposed to be able to create them himself. Student 2B mentioned a website called TurboSquid that has thousands of 3D models for purchase. No one admitted to using these services. It seems that as artists they disapprove, especially those that are constantly seeking to do something new with the medium.

Participants in both groups rely on YouTube for footage of video games that they do not have access to or time to play through themselves. These videos usually provide a form of inspiration to the participants for a specific need. These needs include how to create a randomly generated game (Student 1C), how to do a certain game layout (Student 1F), and how a game approaches showing fire (Student 2E). Student 1C usually searches for a particular game or game level. Issues with YouTube include finding quality video footage.

Student 1F follows Geek & Sundry, a YouTube channel that regularly posts videos of a group playing new tabletop board games. Several are interested in board games and agree that they provide inspiration for their game design. The participant praised the usefulness of getting to know a board game this way instead of having to play it himself. While some were interested in this resource, Student 1C noted that he enjoyed

the experience of reading the rulebook and learning the board games himself. Student 1F also uses YouTube to find lectures and talks by professionals in game design and by other “influential people.” TED Talks were specifically mentioned.

Students 1B and 1C also use YouTube to find tutorial footage for programs. Students in Group 1 agreed that their preference between textual and video tutorials depends on the problem. If it is a visual problem then video tutorials are preferred. Programming issues are better aided by textual tutorials.

Video games

The students use video games as resources either by playing them, knowing of their existence, or as primary source material. Many feel influenced by video games they played while growing up, even if they cannot be found or played today. Student 1E and others in Group 1 say games they make today are influenced by the mechanics of their childhood favorites. They try to improve upon it and put their own style into it. If a student needs inspiration on how to make a mechanic work for a game they are creating, they will often go back and play a game with that mechanic to get inspiration. If the game is not available they will search on YouTube for the particular part.

Student 1C described his method for searching for a game starting with Google using keywords such as the game and/or level name. If he does not know a game that would serve his need he asks someone for a recommendation. If he has not heard of it he looks up the game trailers and walkthroughs to experience the game. Playing games and watching game videos was said to be especially useful during the conceptual phase of game creation.

If game footage cannot be found online, but is required for a class presentation, Students 2A and 2B record the needed parts. If it is a computer game, they can use a recording program called Fraps. Fraps is a Windows application that can record video. They believe it is important enough for a video game design student to own, but it is available on the Windows computers in the game design building. If a game is on an XBox, for example, an expensive piece of equipment called a capture card is required.

Social interactions

The students are also reliant on social interactions to assist their information needs. Both groups mentioned asking other students in the department for general help, particularly recommendations for video games that involve certain elements. Student 1F said that they, as game design majors, are the best source of information. Student 1E suggests working in a group with at least one student who knows the program they are working with so he can get help. Student 1C agrees, stating that while sitting in the game design building the person sitting two seats down likely knows how to help. Student 2A acknowledged that most of them grew up playing video games and generally know what they are talking about. When someone brings up a game that he has not heard of, he then starts the search process to get more information about it through Google. He considers his peers as the best starting point. Student 1D likes to bounce ideas off of others when brainstorming because they will think of something you would have never thought of otherwise.

The students also emphasized the usefulness of talking to those with knowledge of the industry. Students 1B and 1D noted that their professors are the top influence on

their choice of print reading materials. Student 1C mentioned attending lectures of visiting video game professionals.

Acquiring assistance on forums through searching for a particular solution or by posting on it is a form of social information-seeking. The social media interactions mentioned above are also a form of this. Student 1B has received some recommendations for readings, web and print, from individuals on YouTube.

Other disciplines

Several students referred to other areas of study within game design and in other disciplines as sources for inspiration. Student 2B discussed the way video game design is an “umbrella” covering many different areas and how they all have to come together in order to make a game. In this way he related video game design to film.

Student 2A took many art focused classes despite his personal focus in narrative and system design. He appreciates the perspective it gave him so later in his career he will not ask his teammates to do the impossible. Student 2B, however, felt that some of the required classes were actually unnecessary, suggesting that the “umbrella” is too wide.

Both groups agreed that almost anything can serve as inspiration: opera, a play, warp drives, quantum physics, an illustrator’s body of work, a book, existential philosophy, theatrical lighting, sculpture, Roman history, or a city street. Student 2E could not narrow down what influences her because “everything is an influence.”

Group 1 mentioned the fields of sequential art, animation, and filmmaking as influential disciplines due to their emphasis on storytelling. Students 1A and 1E believe that the purpose of their foundation courses was so they could eventually understand how

they can apply those skills to video game design. Foundation courses at this institution include drawing, design, color theory, and other studio art courses.

Student 1C found that bouncing ideas off of his sound design roommate was helpful as it has made him consider design from an audible perspective instead of just visual and mechanical. The students, specifically Student 1C, recognize that they work with a unique and immersive medium where the player can be as involved as the particular game allows. Anything that could help provoke an emotional response is seen as influential.

Print resources

The students' responses on print resources were less unanimous than others. Students 1B and 1D rely on professors for book and print recommendations. Group 2 discussed their enjoyment of "art of" books for individual video games, but their price and lack of library availability inhibits their usage. These books usually include high definition images, concept art, and material written by the artists and creators of that game. *D'artiste* books were also mentioned in this respect. They are a series of books showcasing a particular type of digital art with tutorials. Student 1C refers to *Dungeons & Dragons* and board game rule books when thinking about solving character or mechanical problems in role playing games.

Student 1A still refers to *Game Design*, a textbook from an early class, as a resource to refresh his memory on game design, puzzle creation, team building, rules, and creating a pitch. Student 1F refers to *The Art of Game Design* to refresh his memory on principles of game design.

A digital art magazine, *ImagineFX*, was mentioned by Student 2E as a favorite resource. Student 2A mentioned the video game player magazine *Game Informer* in jest, but someone else pointed out that it sometimes comes with “cool pictures and posters.” Student 2B speculated that a game developer’s magazine existed, but it was not one that any of them claimed to use.

Troubleshooting and problem solving

Students in both groups described most of their information-seeking behaviors as problem solving or troubleshooting. Their information needs are seen as problems to be solved and the students heavily utilize Google searches and the other resources mentioned above to do so. Student 2E often has trouble finding the answers she needs on UDN for UDK, so she resorts to trial and error by checking boxes and seeing what happens. When Student 2D formulates unsuccessful searches, he goes back to the program he is having trouble with to play around more to better narrow his search terms. If the answer does not come up within the first two or three results on Google, he goes back and tries the program again. Student 2E feels that there is a lack of support for concept art in the video game design program. She finds herself looking at others concept art and trying to determine what they did to get there. She considers it an “experimental learning process.”

Just as in studio art courses, Students 1C, 1D, and 1F believe that you have to work on it for awhile and stop and look at it from further away while working with coding in programming or in design.

Students 1A, 1E, and 2D practice taking finished documents, such as PSDs, and taking them apart to understand how to apply the original author's logic to their own work. Other students seemed to approve and use this method.

Students mentioned various computer programs unrelated to art and video game design that assists them in information, time, and group management. Student 1D uses Microsoft Paint to edit screenshots. Students 1B and 1C use Notepad to keep to-do lists and notes constantly up on their computers. Student 1D keeps notes with the Windows StickyNotes application. Student 1C uses Google Docs (now Google Drive) for spreadsheets. Student 1B and 1F use task management websites to organize and manage group projects. Student 1B uses Trello. It allows users to assign users a task, create due dates, and upload documents. It also has an app for mobile phones. Student 1F uses a similar website called Asana. He specifically mentioned its ability to send you emails if you have not completed a task.

Evaluating information

The students evaluate information using their personal knowledge of the industry and with an understanding of the role context plays in information. Student 1D generally takes everything online "with a grain of salt." When evaluating a resource, Student 2E goes with her instinct and her knowledge of the industry. Others use this method. When using VGChartz, Student 2A realized that the numbers did not make sense according to his personal knowledge of the field and knew to double-check them. Student 1B takes the articles on Gamasutra paired with her experience with the field into consideration when reading them.

Student 1A realizes that Kotaku is more for players instead of developers and reads the articles to know what players are talking about. Student 1E understands that professors are human and can make mistakes, so he is sure to form his own opinions. Student 1F understands the differing perspectives of independent and industry video game creators; indie games are all about freedom while industry games just want to make money. He goes into reading reviews and ratings with the knowledge of how people may rate based on their opinion of the creator. Student 2D tries to use credible resources, such as the company who makes a particular game, but realizes that the company cannot release all information and that they are likely biased towards their own games.

Other findings

A difference was discovered in Group 2 between the browsing habits for art and technical information. Both types agree, as Student 2E noted that she seldom browses when looking for technical information. Student 2D specified that he rarely browses, as to him browsing means searching for nothing in particular or without a purpose and he hardly ever has “nothing” on his mind when searching. The students that have experience in both areas mostly agree that browsing for artistic information is possible while browsing for technical information is not.

Parallels between the video game design curriculum and the industry appeared. Student 2A believes that the industry straddles the line between art and business. Indie games are an example of this as they are made for the sake of being made or, “art for art’s sake.” As previously discussed in the chapter on video game design programs, and as seen in the interviews, video games are a mix of artistic creativity and professional business and standards. The students have an inherent need to be creative and do

something new with the medium, but it is unclear if it is “art for art’s sake” or a want to make it in the big business world of the industry. Judging from these 11 students it depends on the student, but each see both sides of spectrum.

Group 2 established a distinction between “game design” and “game development.” The program at this institution is officially a “game development” program and Student 2A believes it is more accurate, but noted that no one thinks about it. These students are all designers and are all “in the business of developing towards games, [they] just do it in different ways.” Upon inspection, the distinction established by IGDA mentioned previously is accurate with this particular program. Students still use the labels synonymously and there appears to be little consistency between them in academic programs across the United States.

Library usage

Students rarely used the library for any video game design related needs. Student 2B has been mostly unsuccessful with using their library’s electronic databases to find academic game information. He noted a specific concern for up to date information when many databases do not include current journal issues. Students 1A, 1C, 1D, and 1E said that they visited the library to do a research project for a general education class. Student 1A and 2E looked for video game related materials, but complained that they were too few and far between. Student 1C needed inspiration for a costume project in a production design course and consulted the library. He praised the accessibility of print visual inspiration. Students 1F and 2D’s reasoning for not going to the library is that they have everything they could need available online. The library at this institution is located

miles away from the video game design building. Students in both groups complained about the location and the extra time it would take to go.

The game design building has a library-like collection of video games, consoles, board games, and technical equipment to check out for six hours in the building. Almost all of Group 1 agreed that they forget that it is there. Student 1F would rather see board games on the Geek & Sundry YouTube channel, but Student 1C argued that it would not give you the experience of personally determining the ease of rules and learning them.

Similarities to art and computer science

Similar to both artists and computer science students, video game design students participate in social information gathering. Like artists, these students sometimes use directed or specific need browsing methods. These students highly value accessibility and utilize Google, like computer science students. Their experiences with the library are also similar in that the library does not have the titles they want. They also do not go to the library often due to the inconvenience of the location and time. A couple students similarly value book recommendations made by professors.

SUGGESTIONS FOR PRACTICE

Video game design undergraduates are a unique user group that balances a drive to be creative and successful in the video game industry. Like traditional artists, they crave inspiration as well as current information about their field. They are very comfortable with technology, as their medium is inherently based in it. They value the accessibility and currency of web resources as well as the web's vastness and diversity.

As a relatively new user group, academic librarians should consider becoming aware of their information needs and information universe in order to better serve them.

The above findings, while many are particular to assignments from this institution, can be used to better understand the bigger user group of video game design undergraduates.

The overall focus of wanting to be prepared for the video game industry is likely a universal need. The specific situations of professors not teaching technique or that the department is not experienced in concept art could be local to this institution, but they are potential problems that academic librarians should be aware of in order to know how to help the students overcome them.

Academic librarians at institutions with video game design programs should consider becoming familiar with the curriculum. It should be noted which distinction the program falls under: video game design or development. Though students use them interchangeably, the official distinction may help librarians focus their collection. Even if the assignments are different than the ones at this institution, the direct connection between these students' information needs and their assignments shows how much power they have over the student. Finding what programs and software the students are using, whether it is decreed by the courses or by student preference, is important. In order to make a video game some type of program has to be used. As the case with any computer program, problems will arise.

Academic librarians should consider collecting both print and web resources for these students. A subject guide would be ideal as the students value remote accessibility. If they see that the library has physical resources that will be able to help them, they might visit in person. A successful subject guide can be used by these students as a one-stop location for their specific and everyday information needs. This creates an instant relationship between the library and the students. The resources and computer programs

mentioned in the focus groups are listed in Appendix B and can be used as a starting point for a subject guide, but this also provides an opportunity to talk to these students. They are very social information gatherers. Talking to others is how they discovered these resources in the first place, so discussing them with librarians will be natural.

Within this subject guide, there could be links to video game company websites and reliable marketing information. A list of suggested YouTube channels, such as Geek & Sundry, could be collected and posted on it as well. The library could continue the relationship with the students by asking that they submit their suggestions. This way the page is dynamic and up to date.

A video game clip repository, similar to what was mentioned by Laskowski and Ward (2009), would be extremely helpful to these students. Librarians can ask for high definition entries from students, be it quality YouTube videos they find or videos created themselves. Students can also assist in creating metadata for them, such as listing examples of mechanics or other elements the clip contains. This can be another way to directly involve the students with the library.

These particular students praised Lynda.com so much, institutional access is worth looking into as an academic library. Depending on the particular academic program, SafariBooks' use as a resource for programming books may also be something to consider.

As much as these students rely on Google, the library could offer Google Search classes or instructional videos to help student's better use the search engine. Resources or instruction sessions could also be provided on group and time management, as both of these are major factors in the students work.

Collecting board games, video game consoles, and video games would not only give students free access to these expensive items but it would also get these students to visit the library more. Specific items mentioned in the study are listed in Appendix B. Several of the students knew that their institution collected some of these, but complained that they were difficult to find and few in numbers. It would also be useful to provide a guide for finding these titles in the library. These students knew about the library-like collection of game and consoles in the game design building but forget that it is there.

The way these students use social media gives academic librarians many opportunities to connect and help them. Librarians can create a specific “Video Game Design Collection” Facebook page or Twitter account that announces when something is added to the subject guide, or serve as a way for students to communicate and share interesting articles with each other, similar to what this institution’s program has.

When collecting anything for video game design students, it is important to keep the many related disciplines in mind. As mentioned in the literature review, artists in general have been found to benefit from the wide scope of subjects in public libraries. Students in this study especially noted the variety of subjects and things that can inspire them.

Library suggestions from participants

Several students in Group 2 suggested things that they would enjoy if the library collected or provided access to. Student 2B liked the idea of having a station with video game consoles that had recording capabilities. This could provide a way to help a library create the previously mentioned repository of game videos. He also thought that having a “texture resource” would be helpful to serve as a reference, especially when first starting

out as a Freshmen. This texture resource could be as simple as high quality images of obscure items such as dead leaves, insect wings, or rocks.

Student 2E felt similar about having a “database” of examples of professional models in order to have a reliable standard to work towards. Creating an online space to collect and provide access to examples of finished documents from Photoshop, Illustrator, ZBrush, etc. that students could take apart and inspect. These documents can be collected from professional art dumps. This way students do not have to spend time searching for them and the library’s website would be even more of a one-stop site for the students.

Student 2B suggested having a resource that provided industry standards of deliverables. This could be created after thorough investigation and perhaps a partnership with a game company.

CONCLUSION

Connections exist between the information behavior of video game design students and artists, art students, and computer science students and professionals. This user group provides similar challenges to academic librarians as art and computer science students. Their complex digital medium and their reliance on non-academic web resources provides new and unique challenges of their own.

Further research can be completed to encompass a greater number of students at more academic institutions to get a general picture of the information behaviors of these students. A study like this could specifically compare and contrast “video game design” programs and “video game development” programs to determine if there is a difference in how these students need, seek, and use information. Librarians could also do more in-

depth studies with a greater number of students at their institution in order to personalize their services even more. Getting to know these students is a first step in understanding how the library can assist them in their academic and professional lives.

APPENDIX A-FOCUS GROUP INTERVIEW GUIDE

Group Introductions: First name, year in school, what your personal focus in the program is.

Explanation of what I'm doing and what information behavior is.

Research Question: What are the information needs of video game design undergraduates?

1. Can you describe an instance where you specifically searched for something (an image, book, piece of information, person, etc.)?

- a. Where did you look?
- b. What were your tactics?

Does anyone else have a different process?

2. What is a "typical" project or assignment in your degree?

3. What other types of projects and assignments have been assigned to you while in this program?

- a. Could you describe one?
- b. What was the most difficult part of the project/assignment?
- c. How did you overcome this difficulty?

4. What has been the most difficult part of all of your classes so far?

5. Do you ever work on anything related to your interests in video game design that is not specifically related to a class or the completion of your degree?

- a. If so, could you explain the type of activity?
- b. What kinds of sources do you consult?

Research Question: What resources and research methods do they use?

6. Are there sources or kinds of information that you find yourself actively seeking again and again?

- a. Describe a preferred tactic or source for this kind of information?

7. Can you describe a time where you just browsed for information related to an assignment or project?

- a. Where did you browse

- b. What sources did you browse?
 - c. Do you have a typical browsing habit?
 - d. What did you find?
- 8. How do you evaluate information to determine if it is relevant or trustworthy?
- 9. Do you have a “favorite” print resource?
 - a. for course work?
 - i. What is it?
 - ii. How did you discover it?
 - b. for professional development?
 - i. What is it?
 - ii. How did you discover it?
- 10. Do you have a “favorite” electronic resource?
 - a. for course work?
 - i. What is it?
 - ii. How did you discover it?
 - b. for professional development?
 - i. What is it?
 - ii. How did you discover it?
- 11. Have you ever utilized the electronic or print resources from the public or university library for assignments related to your degree?
 - a. What sources were they?
 - b. How did you find them?

APPENDIX B-PROGRAMS AND RESOURCES MENTIONED BY STUDENTS

In alphabetical order

Books

Bates, B. (2004). *Game design*. Boston, Mass: Thomson.

D'artiste: Digital Artists Master Class series. Australia: Ballistic.

Schell, J. (2008). *The art of game design: A book of lenses*. Amsterdam: Elsevier/Morgan Kaufmann.

Computer and Web Programs

Adobe Illustrator

Adobe Photoshop

Asana

Calculator

Fraps

Google Docs (now Google Drive)

Maya

Microsoft Paint

Notepad

Stickynotes

Trello

Unreal Development Kit

Zbrush

Magazines

Game Informer

ImagineFX

Web Resources

ConceptArt.org

DeviantArt

Facebook

Flashportal
Flixel
Gamasutra
Kickstarter
Kotaku
Lynda.com
Piecepack
Polycount
SafariBooks
TVTropes
Twitter
Unreal Developer Network (UDN)
VGChartz
YouTube
 Geek & Sundry
 TED Talks
ZBrushCentral

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