Perception, Equity and Accessibility: Comparing Student and Professional Perspectives on Game Development Courses

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Lisa Castaneda
Foundry10
United States
Lisa@foundry10.org

Tom Swanson
Foundry10
United States
Tom@foundry10.org

Abstract: With the games industry now rivaling the size of Hollywood, students are increasingly setting their career-sights on jobs making games. The professional and cultural relevance of video games are leading educators to find the elements of games and game creation that prepare interested students for a potential career, and also provide skill development and value to everyone else. Programs that run today are largely experimental and seeking out the balance between the fun of games and the learning that comes from them. Our work in the games industry, and the topic of this panel, is focused on the act of game creation and three primary questions: what does it mean to make a game? How accessible is game creation to students? And how do we address equity issues in games? We plan to share the insights we have gained through our research and the programs we have run, all focused on finding out what really happens when kids make games.

Introduction

Video games, as a form of interactive media, represent a large portion of the time adolescents spend in front of a screen. According to Pew Internet, 97% of kids ages 12-17 today play games. Although playing video games in educational settings and for the purpose of general learning are a hot topic right now (Malykhina 2014; Griffiths 2002; Bowler 2014) our interest was in the process of making video games at the middle school and high school level. With game development technology becoming increasingly accessible, adolescents are beginning to bridge the gap between the hobby of playing games and career of making them. Research by Swacha et al. (2010), inspired us to look more closely at game development courses and to examine both the students' and professionals' perspectives on making games. What value, if any, is there in having students in middle and high school make games? Do they perceive the skills they acquire to be useful? Is there a purpose besides learning to make games that is evident in a game creation course? What do people who make games for a living think about how kids should make games?

The literature would suggest that there is value in creating games in an educational setting. Robertson and Howells (2008) espouse the belief that learning by making a video game is ideal because it is a rich task in which students must apply a wide spectrum of skills (rules, characters, design thinking, programming and collaboration). Utilizing games as development tools can provide an important stepping stone into general technological skills (Pleva 2004). Although programming is a clear component of game development, making games provides both a broader creative outlet for students and the opportunity to design something that other people will engage with. Masuch and Nacke (2004) describe how making games brings a much more humanistic element into general programming and enables developers to expand far beyond the concepts of traditional computer science. It is also important to note that game development courses can provide an entry point for students to explore computer science concepts. Complex processes can become easier to understand through the simulated aspects and immediate feedback present in a game development environment (Smeets 2005).

In addition to the more technical aspects of computer science and programming, value in game development can also be found in non-academic areas. Bates et al. (2009) referenced the intra-group instructional roles that various students took on as the game development course progressed. These enabled students to better develop their small-group work skills and abilities to negotiate and share ideas. One aspect of game development and design that is easily overlooked is how creating games can be a powerful form of self-expression for students (Peppler & Kafai 2010). In light of the recent popular discussion involving depictions of women in games and the lack of diversity within games, the act of game creation offers a powerful outlet for self-expression. In addition to the constructivist paradigm that is present in games (Papert & Harel 1991) whereby students learn through the actual construction of an artifact, Li (2010) argues that creating games gives students access to a participatory culture. Using the term "enactivism" Li describes how game creation is a vehicle through which students consider emotions, self-knowledge and the culture at large.

Much of the literature investigates students creating games for academic purposes (e.g., creating a math game for another class), in a short-term after school program, or at a college level. Our goal was to look more closely at game development as it occurs during the traditional school day and with younger students. We also wanted to investigate what students discovered about game development when they were creating games for the sake of creating games, not for a particular curricular purpose.

In education, at times when instructors attempt to replicate a "real-world" experience in a classroom, they inadvertently ignore or remove key elements that make the subject engaging in the actual profession. Since many of the instructors teaching game development were never actually game developers, we wanted to try to take into account what real game developers consider important in terms of teaching students how to make video games. In fields such as math and science, standard curriculum has been modified over time as educators have sought to understand how actual scientists and mathematicians "do" science and math. (Ball et al. 2001; Grosslight, et al. 1991). In this study, we attempt to look at game development in a similar vein.

Making games is fundamentally different than playing games. We wanted to investigate how students perceived the process of making games in a game development course, the value they saw in making them, how they perceived the game industry and how their viewpoints differed from individuals who actually make games for a living.

Methods

Student participants in the survey portion were seventh and eighth graders at a suburban middle school in New Jersey (N = 280). At this school, all seventh grade students were required to take an Intro to Video Game Development course for six weeks. They then had the opportunity to select a semester long elective course in game development for their eighth grade year. Students were surveyed at the end of their required seventh grade course and both before and after the longer eighth grade course. Both groups of students primarily utilized Yo-Yo Game Studio's GameMaker software. Surveys were administered by the teacher via an online survey distribution system and were anonymous, tracked by subject ID numbers rather than personal information. Interviews were also completed with the instructor regarding the structure, curriculum and teacher observations of students in the course. Professionals were recruited online from several AAA studios, mid-size studios and indie game studios in the United States, Canada, New Zealand and, Serbia. There were 107 respondents to the professional survey. It was also administered via an online survey distribution system and was anonymous.

Questions for the four survey groups (post-seventh, pre-eighth, post-eighth and professional) were modified slightly for each group. For instance, we were particularly interested in the perceptions of value of game development courses. For students who had not yet taken a course, we would ask them what (if any) value they thought there might be in participating in a game development course. Students who had completed a course were asked to identify what (if any) value there was in taking the course. Professionals were asked to think about what (if any) value might be obtained from a course in game development at the middle school level. Strands of questions which highlight the misconceptions and misalignment students displayed about careers in game development, as well as those that focus on what it really means to make games, are highlighted in this analysis.

All questions except for three were open-ended. Since we were not sure how participants would think about the value of game development and previous attempts to look at perception of game development courses (Swacha et al 2010) were more limited in scope, we decided to make this more of an exploratory survey. Free-form answers were evaluated by a team of researchers who then created a coding scheme for two other teams of researchers. Inter-rater reliability was established prior to the coding of data (85% inter-rater reliability) on a practice set of data from seventh graders.

In addition to the data shared from the survey study, the authors felt it would be informative to also share case study data from two smaller scale game development experiments. These two groups (both groups were N = 4 subjects) completed pre, mid and post interviews with researchers as they worked to create a video game using the Unreal 4 Engine. These subjects were all high school students from four different high schools in the greater Seattle-metropolitan area. The qualitative responses from these participants are included in this data set because they serve to highlight the challenges of game development for students as their skill levels increase.

Results

Perception

There appeared to be a disparity between perception of game creation by participants and reality. 34% of students did not expect to have learned some computer programming in the course. That number consists of 60% of the total females in the course, indicating that females were less likely to see video game creation as a pathway to programming. Of the professionals we surveyed, however, 42% said programming in response to being asked about the value of teaching game development (next to "industry exposure" which came in at 55% of total responses). In context, the apparent disconnect between the students and the professionals may demonstrate a lack of understanding on the part of the students of the technical nature of game creation.

This was further supported by our interviews with the case study groups. They mentioned one of the most significant issues they faced was the coding intensive act of asset creation (textures, A.I. scripts, pathing, physics, objects, etc…). They stated that they felt the level of coding needed detracted from their ability to express their creative ideas for the game. Even at the high school level, with a group of advanced students, the level of technical programming needed for game development was underestimated. A similar effect was observed in our second case study group.

There was consistent misalignment in the acknowledgement of the skills needed for success as a game maker between professionals and students. It is interesting to note that shifts in the perception of the technical skills needed for game development occurred before and after taking the 8th grade course. For example, there were increases from pre-class to post-class answers including coding as a value gained in the amount of 27% in females (up from 0% in pre) and 18% in males (up from 7% in pre). It appears that the experience in the course informed their knowledge of what exactly making a game, and a career doing so, entails.

Accessibility

93% of game developers stated that they believe there is value in teaching game design/development to middle and high school students. However, they also stated that it is not so much the tool the student uses but the process they engage in. This was also evident in our interviews with the case study participants. Over half stated that the value they were gaining was much more about the experience of creating the game rather than just learning the tools they utilized.

The other piece of accessibility the students mentioned in interviews was that the industry as a whole feels more accessible after trying out game creation. Particularly in the case studies, students felt as though making games opened up their eyes to what exactly goes into game creation and what is needed to be successful in that field. In

some cases, this seemed to help the participants recognize that being a game maker might not be for them, but others commented that the experience only strengthened their interest in the field. It is unlikely that the participants would have been able to reach these conclusions without in-depth exposure to the field.

Equity

In the compulsory 7th grade course, the female/male split was 50/50. However, the elective 8th grade course had a split of 19/81 female/male. The number of female participants went down significantly when given the choice to participate for a more in-depth course of longer duration. It is worth noting, however, in the post-8th survey, the female students were much more likely to find broad value in the course than males.

When we asked these students how they picture professional game developers, the responses were overwhelmingly male-oriented even amongst the professional survey group. There were only 1-2 explicit mentions of females being professional game makers at all, in any group, and those were included in pairing with men (for example: "creative men and women who…"). In some of the responses where an indefinite gender pronoun was used (like people, persons, or someone), clear gender identifiers like physical features (most commonly beards) or male articles were used.

Some female participants even went so far as to directly address the idea of a "gamer girl" persona and how they felt they did not fit this image but still enjoyed the class and found value. Many of these respondents were likely to exhibit some self-deprecating qualities in their answers. Included in many of these responses were feelings of self-consciousness or doubt.

Discussion

The findings that we uncovered from our work with video games bring up a number of interesting points for discussion. With regard to perception, our findings suggest that students are not aware of the technical demands of game creation prior to participating in it. Many of these students were avid game players who had not yet made the distinction between playing games and making them. Students seem to have the misconception that because they enjoy playing video games, they will enjoy making them. However, when faced with the technical hurdles and creative challenges of making games, the differences between playing and making games becomes more evident. In some cases, students even decide that game creation might not be for them.

The excitement students have towards games in the classroom can impede their ability to identify the value of skills they are gaining when actually creating them. Kurkovsky stated that "[Video games] been shown to be a successful learning tool by leveraging students' enthusiasm towards computer games and their social relevance." (2009). While our data supports this, we believe the cultural capital of games can be a double-edged sword as the excitement surrounding them can cloud the ability of students to see just how demanding game creation is. The potential result is student disappointment and an overall drop in engagement. Finding ways to get around this and draw out the skills gained through game creation is critical for a curriculum's success.

While over half of the students involved in game creation clearly identified coding as a value of the class, many students did not notice that they were gaining valuable computer and technological skills that would be transferable to other areas. However, it is imperative that we ensure that the skills gained are explicitly highlighted to the students so that they can see the value of this broad array of skills, even if they are not interested in game creation as a career.

In addition to these concrete skills, there were many soft and abstract skills that were gained through making games. Skills like collaboration, project management, critical thinking, empathetic design, and determination were all mentioned by small groups of surveyed students. The case study groups repeatedly mentioned the importance of these holistic skills to game creation and commented on their own growth in each of those areas as a result of making games.

Proficiency in computational thinking is becoming increasingly important in moderns careers, and game making offers a unique way to develop these. "Inheritance, a powerful object-oriented programming concept, can be difficult to grasp in traditional applications. In game creation, however, understanding how inheritance works comes naturally." (Overmars 2004). There are a number of skills that fall into the same archetype as inheritance, and making games is an effective and increasingly accessible way to develop these in the classroom.

The barriers to entry of video game development are increasingly being lowered, as evidenced by the recent explosion of "independent" game developers. Engines are now cheap and user friendly, requiring basic programming ability to navigate, with some not requiring any at all. While the overwhelming response from game developers was that there is value in teaching game creation, the problem has always been with overcoming the barriers that prevent the average person from making games. With the new tools that are available, the value that is mentioned by the professional game developers and now being explored in schools is only going to become more common.

It is important to remember that, as we continue to study game development in classrooms, the value is not as much about the specific software the students are learning, but rather the way of thinking and enthusiasm that game creation inherently fosters. Creativity and determination are built alongside programming and computer proficiency, and a toolkit of modern and immediately applicable skills emerge from the act of making games.

Recent trends in the video game industry clearly point out problems with equity. Our data show that females still feel alienated and removed from video games, which affects their ability to engage with the course. Whether it be due to a lack of other females, erroneous perception of who game developers are, or some other issue, the clear indication is that females are less likely to feel comfortable in a class on game creation. This was true not just in schools, but in almost every situation we observed where females were making games. As a compulsory course, video game development achieves an even gender split, but this removes an element of choice we feel is essential to realizing as much of the potential value as possible from the course.

The fact that students in our survey had a bias towards males when imagining professional game developers (with a few negative qualifiers like: fat, alone, darkness, and parent's basement), indicates an unfortunate trend towards a very niche stereotype of who makes games. We believe that dispelling this notion is important to helping all students better envision themselves in the role of a game maker. Our own research strongly suggests that adolescents are more apt to pursue avenues in which they see others who look like themselves. This would lead to better consumption of the course material as a whole, and hopefully help students better recognize the skills they are gaining and how they transfer to other areas.

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