Empowering Children for Their Nutrition Choices with Game Design

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ÖZET

Eğitim, sağlıklı beslenme seçenekleri, ve teknoloji ekipmanları çocukların geleceği için çok önemlidir. Fakat, bunlar genelde büyükler tarafından önerilip, dizayn edilip, ve kontrol edilmektedir. Bu çalışmada biz 5. Sınıf öğrencilerine 1. Sınıf öğrencileri için oyun yapmalarını istedik. Bu proje gösterdiki; çocuklar hem kullanıcı, hem test edici, hem de saglıkla ilgili oyun dizayn edici olablirler. Sonuçlar gösterdiki az oyun oynayan çocuklar bile beslenme ile ilgli anladıklarını anlamlı şekilde yaptıkları oyunlarda gösterdiler.

Keywords: Game design, technologies for children, Constructionism, learning by design.

ABSTRACT

Education, the nutrition choices, and technology equipments for children are important for their future. However, these are mainly suggested, designed, and controlled by adults. In our study, we asked fifth graders to design nutrition games for first graders. This project indicated how kids can be users, testers, and designers of kids' games and learn while taking these roles. The results showed that students who had rarely played games were able to reflect their understanding of nutrition concept on their games.

Introduction and Theoretical Framework

Childhood is a "dark room" that we all adults went through but hardly remember what was about except some memories. We can tell whether or not we liked and enjoyed "seek and hide" but we can barely tell why we liked and enjoyed that game. With the technological changes, of course, the new generations' childhood world is not limited to "seek and hide" anymore. Children are now playing computers games getting into virtual worlds such as teen second life, whyville, or webkinz.

Children engagement for the new technologies, especially computer games, has been studied by scholars from different perspectives. Researchers from informational technology background have been looking for ways to find best technology equipments for kids. On the other hand, learning scientists have been exploring how the new technologies can improve kids' learning.

Researchers from informational technology view proposed different approaches that have been adapted for the children's roles at the design process of information technology [1]. One of the well-known approaches is User-Design, which focuses on the end users of the informational technologies. However, it is found that the user involvement is limited at that approach [1].

Contextual Design approach observes the context of the end users and examined who the users are and how they work. From the plan process to using process, Contextual design approach provides five work models to designers. Children involvement in a Contextual Design during a design process is also limited to only users' suggestions.

Cooperative Inquiry is another approach that helps the field of informational technology to involve children and design proper technologies for their proper age. According to Druin [2] "*Cooperative inquiry is based upon the belief that partnering with users is an important way to understand what is needed in developing new technologies*"

Based on her approach, [3] studied children partnering at the technology design process. She emphasized that children have their own cultures to act in and what has been produced them is based on assumptions and biases. In her Human-Computer Interaction Community work, Druin sees children as users, testers, informants, and partners [3]. However, partnering is limited to children' communication with the technology designers and children will barely be capable to reflect their creativity on the design.

Nevertheless, in order to expect a full engagement from children in a technology design process, we suggest a constructionist learning approach, which asks children to design artifact that can be shared with community to improve the design and learning. From planning, to testing, and presenting, game design is a problem-solving process that requires creativity. And according to Rieber et al. [4] this creativity leads to intellectual "ownership" of the game content that reflects kids' thinking and feeling.

In the literature, there are similar approaches emphasizing children game or artifact design. For example, Constructionism [5], Learning by Design [6], Learning by Doing, and Learning by Making [7] propose similar ideas that kids have to design artifacts to reflect their understanding and feelings. However, as a wider umbrella, we take Papert's Constructionism as the base of this research.

Constructionism is based on Piaget's historical statement that "children don't get ideas; they make them". Papert, Piaget's colleague, however, distinguishes his theory from constructivism in two main aspects. The first is an internal and an active process where students construct their knowledge from their experiences in the world. The other aspect of Constructionism is external, based on research that suggests students learn best by making artifacts that can be shared with others. This aspect promises that individuals learn best when they are constructing a sharable and meaningful artifact based on their knowledge [8-10].

One of the most distinguishing features of Constructionism is programming or designing games. Designing sharable artifacts that reflect students' different styles of thinking and learning make that principle of the theory most important. Based on the project of student design of instructional software, Kafai claimed that designing the artifacts or programming the software helps students reformulate their understanding and expression of their personal ideas and feelings about not only the subject but also the artifact [11]. Papert also sees programming or game making as a construction tool for personal expression and knowledge reformulation and this tool helps students explore psychological and cultural aspects of learning environments [12]. Bruckman and Resnick also stated that learning takes places effectively when students are engaged in constructing personally meaningful projects [13]. Robertson and Howells affirms that children exercise a many skills such as setting game rules, making dialogue, visual design and programming when they design games [7]. Feedback in Constructionism is more than a reflection that is provided as a result of information display. The learners receive two types of the feedback from displaying the designed artifacts. First of all, the audiences consider the content information that designer included in the artifact, and the representation of the designers' knowledge occurring in the artifacts is also available for the audience to evaluate. The feedback that younger students left every time provided an opportunity for the designer-students to revisit and modify their games.

The Design Process

Ten 5th graders (4 girls and 6 boys) were assigned in their science class to design a computer game using *Gamemaker*^{TM}, an object-oriented and freeware game design software, for the purpose of teaching first graders about nutrition. Prior to the game design, students had one lecture session about nutrition and only two students had experience with the software. The students met for 45 minute-sessions twice a week for 8 weeks. Students were first taught how to use the *Gamemaker*^{TM} software for one session. The study was designed to promote collaboration among students. Similar to previous studies [6, 14, 15], students game design process promoted collaboration. Within a small class, all the students ha chance to test others games to not only leave feedback but also get ideas for their own designs. The technology and science teachers facilitate the sessions for students' game and nutrition related questions.

The first graders from the same school played the games in pairs, with the game designer of each game (5th graders) sitting next to them. The first graders provided the game designers with their feedback as they played each game. Once the project ended, all ten 5th graders were interviewed. Emphasis was placed on what students believed they learned about nutrition, how they learned the programming strategies, and why they made specific game design decisions.

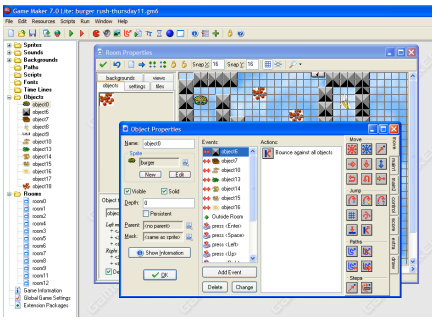

Figure 1: A screenshot from A Student's *Gamemaker*^{TM} platform: Adding actions to the character

Conclusion

Similar to previous studies, our study showed that the students become active participants and problem solver by designing their own games [16], socialized by sharing their designs with others, collaborative by asking others for help [11], and empowered of their own learning by reflecting their understanding [4]. Thus, "*Children can become deeply invested in their learning when they feel empowered to choose what they learn and the ways in which they learn*" (p.6) [4].

In our project, for example, students had ownership of nutrition concept in order for them to be able to successfully express their personal thoughts and intentions in their games. It was observed that all the students applied a basic nutrition concept of "*fruits*

and vegetables are healthy but too many desserts is unhealthy" in their game design.

Based on the 'External' component of constructionist learning, the students were asked to share their design with peers and first graders. This task helps the students become tester for peers' games and leave feedback for other designs. However, this testing process became a reflection for their designs. Students start ask the peers how they did certain features and how more functions can be added to their designs. Similar to that, the first graders' game testing also help the fifth graders to improve their designs based on their observation while first graders played the their games. During this testing process fifth graders had chance to do formative evaluation for their nutrition content in their games. This proves that first graders not only learned about nutrition content but also helped the fifth graders to redesign their games by leaving feedback for their games. By designing the games for a target audience, students considered usability, accessibility, and other game design components for the first graders.

Overall, our game design project was a "powerful learning environment" which is seen as learning environment that students highly engaged and worked collaboratively for their individual design needs [7]. Empowering the fifth graders for designing their own games increase their motivation, therefore, engaged them to work on the task. Sharing their designs with others help the students improve their understating of the game design and nutrition content.

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