
**Purpose**

“…investigate the educational impact of using game making software in a classroom setting.” p. 560 (Neverwinter Nights software)

Study looked at learning with respect to Scotland’s “A Curriculum for Excellence” which “establishes a set of principles for learners from the ages of 3-18, based around developing pupils’ capacities as: confident individuals, responsible citizens, effective contributors and successful learners.” p. 559

**Methods**

Thirty 9-10 year olds in a class with their teacher and ICT specialist took part. Of these, six students were selected for case study participants: three girls, three boys, and two students in each category were of high, medium and low ability. (Scotland)

One 2 hour introductory session before class started, then eight 2 hour sessions spread through one autumn term. The computers labs accommodated only half the class at a time, so there was 20 minutes intro for the whole class, 40 minutes hands-on for half, 40 minutes hands-on for the other half, 20 minute discussion with the whole class.

Introductory discussions (20 min) were to introduce software skills or to discuss games that had been created by the researchers or the class. Children were given a goal for the session or told to have an exploratory time with the software. Children worked independently while adults assisted with individual queries (consisting of the 3 researchers, class teacher an ICT specialist). At the end 20 minute discussion, they talked about what they had learned, what they were puzzled about, what to do next time and sharing knowledge, receiving praise. Next-to-last sessions, children were peer-reviewers and tested others’ games. Last session, parents were invited and the children were asked to teach the adults how to make and play the games.

Interviews w/ case study children, teachers, visiting “educationalists” and parents
Children’s questionnaires and worksheets
Researchers’ observation notes
Researcher’s observations and immediate reflection son children’s behavior

**Findings**

Thematic analysis to “characterize the breadth of children’s learning under … successful learner”.
Analysis indicated that children displayed motivation and enthusiasm for learning (student feedback), determination to reach a high standard of achievement (students worked on more complex aspects of the game, would seek help to add more complex features to their games).

Analysis indicated that children displayed skills in: independent learning, learning in a group (worked alone and also collaborated with each other, would share information they found on their own with a group, would help each other with “storylines” of the game); linking and applying learning in new situations (educationalist believes some students took on re-drafting/re-writing of ideas in one subject from this game class; also would work on writing skills by writing about their video games).

The creating thinking skills developed through game making in Robertson and Nicholson (2007).


Purpose

“…game playing has the potential to increase student engagement in school activities, their task persistence, and their motivation to learn, and that these factors then serve to mediate improved achievement, as well as promote the development of collaborative skills and social learning strategies.” p. 979

1) Can computer game development as a pedagogical activity lead to improved learning of basic literacy skills?
2) What new digital literacy skills do students acquire as a result of this activity?
3) What is the impact of game development on student classroom engagement?
4) How do teachers adopt and shape the practice of student game development in the classroom?

Methods

4th grade, 9 public elementary schools (Canada)
In middle to lower-middle income suburban neighborhoods
Students in the study have avg 68% in standards for reading, 70% in standards for writing (end of 3rd grade); province is at 62% and 64%

Each school had two classrooms participate in the study; either all 4th graders or a mix of 3rd and 4th. Each class in a school was randomly assigned to either experimental (game playing) or control.
They had a half-day workshop to instruct all teachers on the social studies curriculum that was developed for this study. Teachers in the experimental group had to teach an extra lesson about creating effective questions for their games to “develop higher level, inferential thinking questions.” Experimental teachers introduced students to the game tool, making their first games based on anything they want. The second game was based on the board game TicTacToe and had to be related to the first lesson of the curriculum unit. The students had to do research on their game topics and then compose questions about various aspects of their topics.

Teachers in both group spent an avg of 1 hour per week over 10 weeks to teach the unit and complete all activities. Experimental teachers took an additional 1 hour over 10 weeks for game construction and playing. 8 or 9 schools completed the study.

Throughout the 10 weeks, a member of the research team visited the schools at least once to ensure the experimental program was implanted as designed and 2 of the schools were used for more detail and visited 5 times out of the week. During these visits, observational notes and informal interviews with the teachers and students were conducted.

Experimental teachers were interviewed in small groups

All students were given pre and post tests on literacy skills based on Vocabulary, Passage Comprehension, and Sentence Comprehension.

At the end of the study, students were also given a student writing test on vocabulary, sentence combining, and logical sentences.

**Findings**

Quantitative: pre/post tests on literacy skills had no statistical significance. End of the study test on student writing had a statistical significance (p=.002) on the logical sentences section only.

Qualitative:

Teachers reported that they believed there was increased content retention, higher engagement in activities related to comparing and contrasting outcomes, encouraging students to utilize more and different kinds of research materials, enhancing editing skills and providing insight into questioning skills (impact of game development on basic literacy skills).

Development of digital literacy skills: teachers reported that students shared their computer expertise and actively helped each other resolve technical issues; increased knowledge of the game software; used variety of learning materials.
Student engagement: Teachers reported some students continued to develop games on their own outside of class time, in relation to their own hobbies and interests. Teachers reported that they had to be re-directed from both these personal games and the curriculum-based games during the school day as a sign of motivation and engagement.

Teacher classroom practices: The teachers of this project spoke together and worked together: one teacher extracted “essential content” of the lesson, wrote it up and shared it. Some teachers modeled the type of higher-order thinking questions to their class and discussed them; some students used smart-boards to share all group questions with the class to discuss as a whole.


Purpose

To look at the learning outcomes between a traditional textbook/lecture-based course on numerical methods in mechanical engineering to that of a class based on using video games as the center theme and project. (Undergraduate.)

Looks at the amount of time students spend on their coursework and the importance that they attach to the work.

Method

Class was taught with a video game called NIU-Torcs (akin to Gran Turismo 4). The game has a “high-fidelity simulation of the car’s physics, including the engine, transmission, differential, suspension, tire mechanics and more.”

Each student receives his/her own car which sits motionless on the track. There are no steering wheels, gearshifts, accelerator or brake pedals to get the car to move. Instead, the student has to write a C++ program that gives the car driving commands: how much to step on the gas pedal, how much to step on the brake pedal; which gear the transmission should be in … Students are able to see the fruit of their effort as the car runs in real time, displaying the behavior of the car in full 3D graphics.

Making the car move fast and nimbly around the track without skidding is the challenge that takes about the 15 weeks of class to realize.

First the students are asked to devise a simple algorithm to steer the car towards the center of the road as it rides on a serpentine track. There is no direct relation to numerical methods, but gets them hooked into the project. Also gives them practice with writing a computer program.
Then the game became more challenging: given levels to the game, such as a distance away from a finish line where the car must drive towards and cross during a specific amount of time. This requires that the shifting of gears be precise. Students work with the instructor to calculate the optimal shift points.

Over two and a half years, they recruited 86 undergraduate mechanical engineering students to construct concept maps for their numerical methods course. A little less than half enrolled in the game-based course; others were in the traditional courses. Some of those students taking traditional courses are from another university that do not offer game-based courses.

Group A consisted of the 2 game-based numerical classes, with 38 students (over 2 courses); B (9 students), C (6 students), D (20 students), E (13 students) are the classes with the traditional course from two different universities.

Findings

Time on task: students in the game-based course spent roughly the twice the average amount of time working on their course work. This is an above-average workload and more than 90% of eligible students taking the class later chose to sign up for the same type of work in an elective course in the same sequence within the curriculum.

Learning measures: Hard to measure, as different instructors grade differently and students in the game-based course do not take or study for a midterm or final.

Students in the game-based course instead create concept maps to convey what they have learned about numerical methods. Concept map: a graphical construction of nodes and lines. Nodes are important concepts, lines indicate relationships between concepts.

Game-based students had more connections showing relationships between their concepts -> deeper learning.

Students rated their courses and game-based students viewed their content in the numerical classes are more valuable.

Based on concepts maps, evidence shows that they learned the material at a deeper level than students taking typical text-books.


(as told by Robertson, Howells … find this resource)

A class of 4th grade children made their own educational fraction games using the Logo programming language.
The project was successful in promoting learner autonomy by putting the children in control of their own learning and thinking and challenging them to plan and manage the complex process of creating their own game.

This project took place over a 6 month period. Children took on many roles, including: user, designer, writer of storylines, teacher of fraction concepts, and programmer.

Considered ground-breaking and launched more studies of using specialized game programming toolkits.

The educational and motivational content of digital games made by children.

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ABSTRACT: Previous studies of children making educational games (Kafai, 1995; Reiber, Luke and Smith, 1998) have shown that children rarely attempt to integrate learning content with the fantasy context of the games they create. Malone (1987) defines an intrinsic fantasy as one in which there is an integral and continuing relationship between the fantasy context and the instructional content being presented. One of the explanations offered for this lack of intrinsic fantasy in children's games has been the prevalence of extrinsic models in commercial digital learning software, and more generally in the formal education system. Consequently, in this study, children were provided with concrete models of both intrinsic and extrinsic fantasy in two contrasting example games before designing and creating their own educational games. Furthermore, they were encouraged to use their games to teach non-curriculum learning content which is more easily distanced from the pedagogical preconceptions of formal schooling. Forty children between the ages of seven and eleven took part in this study (17 boys and 23 girls), attending an after-school club for one hour a week over a period of 18 weeks. The children spent the first 8 weeks learning how to use a visual programming tool (Stagecast Creator) and spent the remaining 10 weeks designing and making their own games. The children produced 34 game designs, 29 finished games and transcripts were made of interviews about their choices and experiences on completion of the project. Despite the use of an intrinsic model and a free choice of learning content, there was no increase in the number of intrinsic games over previous studies. 44% of the games and designs did not include educational content at all, and were not considered to 'help player's learn anything' by their authors. 26% of the games and designs were considered educational by their creators, but suffered from significant misconceptions in their choice and implementation of their learning goals. Examples include games that attempted to teach players how to drive cars, fly planes or swim by moving a character around the screen using the cursor keys. 26% of the games were extrinsic in design, nearly all following the same multiple-choice question and answer format provided in the extrinsic model. Only a single game had intrinsic learning content that was identified by its author as relevant.
outside of a gaming context. This game taught players not to touch dangerous electrical
items, by making them switch off a number of electricity pylons in order to safely
progress through a maze. An analysis is offered in which the children failed to create
their own pedagogical models for non-curriculum content and so either created a game
without educational content, or one which was incapable of meeting its learning goals.
Furthermore the interview data shows that the children found it difficult to perceive the
educational value of either the intrinsic model or intrinsic reinterpretations of their own
games. The possible implications for transfer and learning in intrinsic educational games
are discussed.

to support middle school girls creating animated stories. IEEE Symposium on Visual
Languages and Human-Centric Computing.

**Purpose**

Generate interest in females to move towards computer science through designing “Pixar-
style 3-D movies (animated stories) will help motivate girls to program.”

Use Alice programming software.

**Method**

Participants were drawn from 3 sources: a technology camp for girls of 7th and 8th
graders (30 girls); a 3-day Alice workshop held for girls at a museum (20 girls); and local Girl
Scout troops (21 girls). Ages ranges from 10-16.

The girls had to storyboard their ideas, complete the Alice tutorial to become familiar
with the system, create an animated movie with Alice. They had sessions that lasted from
4-9 hours. They took about 60 minutes to storyboard and about 30 minutes to go through
the tutorial, using the rest of the time to create their animations.

Girls first used storyboarding to come up with their ideas. First they came up with a
description of their move. Next they were asked to break it up into scenes. For each scene,
the girls had to describe the setting of the scene, the action that occurs in the scene, and
the purpose of the scene. Then each scene had to be storyboards with 6-9 frames,
writing a sentence per frame to discuss the action of each frame.

Girls in the tech camps and museums worked in pairs; Girl Scouts were individually.

**Findings**

Girls in the pairs could not agree on the storylines and often mostly discussed the
storyline rather than work on the story/software.
With the Girl Scout groups, girls were set up to work individually but had close workspaces so they could talk with each other, share ideas, show each other their games.

Using a 3-step storyboarding process is much easier to break down the game (as described) instead of their original idea to read a storyboard handout and proceed.

Better to have the entire storyboard planned out before working with the software, so their knowledge of what is going to be easy/hard with the system distorted their goals.

Having their storyline firmly in place, it motivated the girls to pursue complex programming structures (like parallelism and loops) into their animations to complete their stories.

Nearly all came up with a story they were excited about and they were motivated and enthusiastic to work on their stories. In the camp settings, girls came in early on their last days so they could finish their stories. In the workshops, girls continued working during their breaks on the games.