Newtoon

Newtoon is a mobile phone and web activity which aims to embed physics learning in mobile gaming. It enables young people to author, play, edit and share fast-paced microgames on a PC or mobile phone, where game rules are based on a set of Newtonian physics principles.

Team
Futurelab
Soda Creative

Technology
Java-enabled mobile phones
Website

Outline

Newtoon is a mobile phone and web activity which aims to embed physics learning in mobile game creation and play. It enables young people to create microgames via a web interface on a PC, in a 2D world consisting of balls and springs. The games can be trialled and edited on the PC and various physics principles regulating the movement of objects can be manipulated via the interface. Each game lasts only a few seconds, during which students need to figure out how to play the game. A number of these microgames can be aggregated into 'gamestacks', shared with other players and also played on a mobile phone.

The Newtoon experience involves a number of important learning opportunities. By authoring their own games, children are able to visualise laws of physics and manipulate their parameters with the aim of creating exciting and challenging game experiences for their friends. Through actively creating and editing these games, children can experiment through trial and error and observe the effects of their designs. As the online collection of experimental games grows, young people are encouraged to become a community of physics learners.

Newtoon is an attempt to inspire children to become more science literate and to bridge the gap between learning abstract science 'concepts' and actually 'doing' science through simulation. More broadly it is hoped that by actively constructing science-based mobile games, students will be motivated to make use of web applications and mobile phones for the purpose of learning. The evolution of a gaming community has the potential to invoke an interactive and collaborative classroom culture with 'doing', debating and deliberating science at its heart.

Research and Development Process

Futurelab and partners Soda Creative worked together in order to develop Newtoon as a valuable and research-informed experience aimed at and trialled with Key Stage 3 science pupils. During the development process we held workshops with physics teachers, leading academics and experts in the field of science learning through ICT to enable us to determine a coherent and varied 'toolkit' for the Newtoon microlab corresponding with particular aspects of the science curriculum. The web application was developed so that participating children could access it from home and school in order to create, play, edit, share and rate each others' work, and the prototype was designed for Java-enabled mobile phones so that pupils could carry the games they created with them.

We worked closely with teachers and learners throughout the design process in order to develop and pilot Newtoon with Year 7 secondary pupils, and conducted research trials to ascertain its potential for learning.

Scenario 1:

A science teacher is anxious about KS3 Unit 8J: Magnets and electromagnets. She wonders how she can excite her pupils about the world of magnetism. The teacher launches Newtoon on the whiteboard and searches for a tutorial on 'magnets'. She opens a research microlab and by moving and rotating the bar magnet, she demonstrates that the ferrous bar always attracts while the bar magnet both attracts and repels depending on polarity. On their desktops, the pupils then select 'dog's dinner', a microgame which explores magnets. Racing against the clock, the pupils steer a dog towards the bone, avoiding the magnetic forces.

Scenario 2:

During the science lesson, all the pupils' games are automatically collected into a gamestack at the Newtoon website. At home, a pupil, Laura loads the gamestack onto her mobile phone and challenges her family to play her creations. "How does it work?" her mum asks. Laura explains that her game, 'dream-date', uses magnetic variables to make her game characters attract and repel each other depending on how 'cute' they are, using pictures she has imported from the internet. She then shows her mum that her game has been the most played by her classmates, and that she has improved in her understanding of physics.

Key Findings

- Newtoon had a striking effect on learner engagement: students of both genders and all abilities embraced the experience with enthusiasm. Five key factors contributed to this engagement, namely: authorship; ownership; playful/experimental learning; the social value of the games; and being involved in authentic, real research and development activities.
- Newtoon was a good tool for supporting and consolidating learning, with many students showing clear improvements in their understanding of key concepts after the trial.
- Newtoon presents a challenge to more 'traditional', didactic pedagogies. The most effective use requires a more dialogic pedagogy, with the teacher facilitating discussion and actively encouraging peer-to-peer transfer of learning.
- Students who used Newtoon at home tended to involve parents and siblings.
- Those that managed to use the prototype at home extended their learning through interaction with parents and siblings.
- Newtoon's create-play-edit-share formula shows clear potential to be developed to encompass a wider range of scientific concepts, and for it to be integrated into various stages of the curriculum as both an extension and consolidation learning activity. There is also clear potential to broaden the gaming/learning community beyond the bounds of a class, a school, or even a country to harness greater peer-to-peer learning potential.

There was a good connection between subject content and how this translated into interesting and exciting game-play. Moreover, the various elements contributing to the development of interesting and engaging game-play environments and the accompanying creative processes placed learners, or players, in control of developing their own content, and helped make the Newtoon experience a successful one.

For further details, please see the Newtoon research report, available from **www.futurelab.org.uk/projects/newtoon.**

Partners

This idea was submitted to Futurelab's Call for Ideas programme by Soda Creative.

Contact
Futurelab: Tim Rudd,
tim.rudd@futurelab.org.uk

Soda: Ed Burton,
ed@soda.co.uk

Futurelab
1 Canons Road
Harbourside
Bristol BS1 5UH
United Kingdom

tel: +44 (0)117 915 8200
fax: +44 (0)117 915 8201
e-mail: info@futurelab.org.uk
blog: flux.futurelab.org.uk
www.futurelab.org.uk

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