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The Role of Games in Education

WHO'S INSIDE

Amplify Education, Inc.
BrainRush, Inc.
Cengage Learning
DESQ Ltd.
Educational Testing Service
Electronic Arts Inc.
GlassLab, Inc.
Microsoft Corporation
Mojang AB
Oculus VR, Inc.
Pearson
Rovio Entertainment Ltd.
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TeacherGaming LLC
Triumph Learning
(Haights Cross Communications)
Zondle Ltd.
Zynga, Inc.

Market Analysis

Advancing the Business of Information

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Why This Topic

Games and education are closely linked. Educators are keen on tools which generate the focused attention that both children and adults devote to games, and harness the motivational effects of game-based learning, and of gamification (the use of game design elements in non-game contexts). The market map is shifting, with hardware producers like Microsoft and Sony and games developers such as Electronic Arts getting more involved in education, either alone or through partnerships. The use of games and gamification in education, however, remains nascent; there are pockets of innovation where gaming is at the centre of the educational process, and pockets of dissent where games are viewed as frivolous occupations with no role in formal education.

This report takes the market's temperature, looking at the benefits which games and gamification can bring to preschool, K-12, higher education, and corporate training; the challenges of using games and gamification in an educational setting; and the activities of key players in this area. Best-practice case studies show how solutions providers have used games and gamification techniques to improve educational outcomes and assess learning. The report also discusses whether games will ever become a mainstream tool for the delivery of education.

Methodology

Outsell conducted desk-based research for this report, looking at blogs and mainstream press as well as journal articles investigating the impact of games and gamification in education. We also performed primary research in the form of interviews with publishers, hardware producers, games developers, and creators of educational games to complement this secondary desk research. These activities, plus daily dialogue with the market and key stakeholders, informed the following opinions and views.

The Role of Games in Education

It is important to distinguish between game-based learning and gamification:

- **Game-based learning:** The inclusion of games, usually in a digital format, in the instructional process. Successful video games incorporate classic learning doctrines, which are supported by principles of cognitive science, including:
  - Ordering challenges so that players face simple problems early on in the game that help them develop suitable approaches to subsequent, harder problems. This concept of productive struggle encourages students to try, fail, and try again using strategic thinking and problem-solving skills.

- Lowering the cost of failure so that gamers feel empowered to take risks, and to use what they've learned in unfamiliar situations.
- Making the problem-solving process challenging but achievable, and placing it just at the edge of a gamer's "regime of competence".
- Integrating continuous assessment within the game, not after it is over like a test in school.
- Encouraging gamers to practice repeatedly by integrating basic skills under larger meaningful goals and actions.
- Engaging the social aspects of learning via collaboration and competition.

- **Gamification:** The use of game design elements in non-game contexts. If a teacher awards merit points, uses a leaderboard, or distributes badges to award achievements, he or she has gamified the classroom. Key gamification elements include:
  - The use of points to recognize performance and achievements.
  - A marketplace to convert those points into goods and services.
  - Individual and team-level challenges to drive competition and collaborative teamwork.
  - Back-end administration to allow organizations to design, introduce, and measure the impact of gamification.

Benefits of Using Games in Education

Educators often use games and gamification to motivate their students and deliver improved learning outcomes. The application of gamification in a digital setting enhances its capabilities, with classes able to participate in global leaderboards. Many K-12 educators see games as a tool through which they can engage students, particularly those with whom they find it hard to connect, in a familiar games-based setting.

Using games and gamification in an educational setting has a number of benefits, including:

- **Increased engagement:** A 2013 Gallup poll found that just 30% of full-time employees in the US feel engaged at work. This figure follows on from engagement levels at school, where 44% of high schoolers, 61% of middle schoolers, and 76% of elementary school students report feeling engaged in the classroom. Engagement levels seem to decline as students move through the educational system, yet engagement with games remains strong: nearly all US children (99% of boys under 18 and 94% of girls) play video games regularly for at least one hour each day. Indeed, US K-12 students spend a lot more time playing games than they do on their homework. For educators, popular games such as Minecraft or The Sims provide a valuable way of connecting with disengaged students. This does not always

mean modifying the game to include educational elements, although that is a popular path to go down. As an example, one UK school allowed 11-year-old students to play Minecraft and then write stories inspired by their activities in the gameworld. This proved particularly successful with boys disaffected with reading and writing.

- **Increased motivation:** Reward mechanisms provide positive feedback loops for learners of all ages. Leaderboards provide learners with a measure of their performance against that of their peers and incentives to improve. This works at both an individual and a collective level. For example, one college professor gamified his class on game design, dividing the student body into five guilds which did projects together. In the 40-question midterm exam, however, students work alone, but if any member of a guild gets the final 10 questions correct, then all guild members receive credit. The professor commented, "I was afraid that would make people lazy, or it would tip people into a better grade than they deserve, but it doesn't. What happens is the students want to do it for the other people in their guild. And when they do, they get congratulated for it . . . that is the intrinsic reward".
- **Improved learning outcomes:** An SRI International study which reviewed 77 journal articles relating to K-12 students studying science, technology, and maths found a moderate-to-strong effect in favor of digital games in terms of broad cognitive competencies. Students saw results improve by an average of 12% if they played the games.
- **Encouraging practice:** Games require complex mental processes. The more gamers practice, the more these skills improve, enabling them to proceed to more difficult tasks. Deliberate practice is a crucial part of consolidating learning.
- **Presenting real-time feedback:** Rather than waiting for an educator to grade a piece of work, gamers get instant feedback on their performance and suggestions for different ways to improve, which contributes to a positive development loop.
- **Teaching 21st-century skills:** Games are creative spaces where individuals can work on critical thinking and problem-solving skills, areas which traditional education is less good at teaching. Skills like hand-eye coordination are also supported: a neuroscience study at Iowa State University found that surgeons performed more accurately on the operating table when they regularly played video games.
- **Built-in failure cycles:** In games, failure is acceptable and even expected as part of the learning process. This encourages experimentation and risk-taking, in contrast to high-stakes tests which encourage risk-averse behaviour. Research on human decision-making shows that in high-stakes situations, people tend to revert to well-known safe behaviours as they mitigate for risk. Games provide a sandbox for trying different solutions, and are valuable for building entrepreneurial attitudes.

Challenges to Using Games in Education

Particularly in higher education and professional settings, games are viewed as being childish or inconsequential, with no real educational value. Games imply the notion of "play," which runs counter to the concept of learning as "work." The perception of games as activities which are only undertaken by children means that their usage in an educational context has progressed further in K-12 than in higher education or corporate training. However, there are valuable examples of the use of games and gamification in these markets, so it is important not to view games as being only suitable in K-12.

Other challenges include:

- **Narrow focus:** The narrow nature of many games compared to the breadth of the curriculum means that their use is limited. For example, SimCityEDU: Pollution Challenge provides an engaging way of teaching students about environmental issues, but these issues form only a tiny part of the curriculum.
- **Student safety:** Games creators must protect student users from anyone looking to enter the community for illicit purposes.
- **Fitting games into the classroom:** The joy of some games is their longevity, with gamers playing repeatedly until they have achieved their goals. This can be a challenge when lesson time is strictly limited.
- **Ensuring suitability and appropriateness:** Educational games developers do not always have an understanding of the neuroscience behind learning, or what happens in real classrooms. These issues are crucial to building successful educational games, although less important in a pure games setting.
- **Balancing good game play with educational needs:** This is known as the "chocolate-covered broccoli" problem: there is a danger that focusing on educational objectives can make the game less fun than a game designed simply to engage the end-user.

Market Definition and Structure

This report looks at the use of games and gamification within formal educational environments. It does not cover the educational entertainment ("edutainment") side of the industry, where providers deliver educational benefits through consumer-focused products. Leapfrog is a classic example of a player in the edutainment side of the market, targeting games, toys, DVDs, books, apps, and tablets with an educational remit directly at the consumer market.

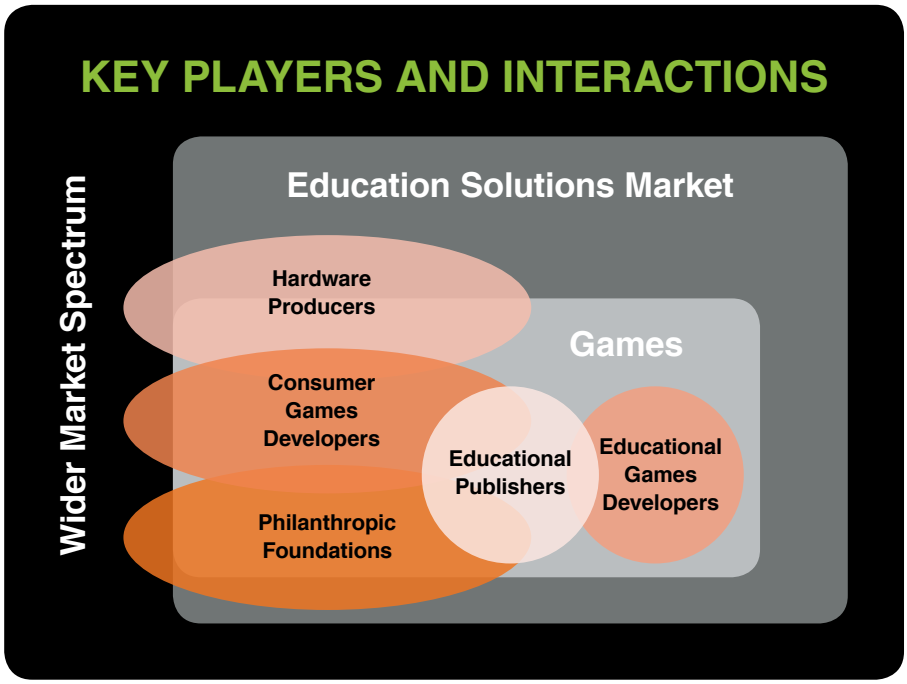
Market Structure

Consumer games producers and creators of educational offerings are starting to bump up against each other. For example, Rovio, the creator of Angry Birds, recently launched Angry Birds Playground, an educational program for children aged 3 to 6.

The gamification space is poorly defined in terms of a market structure or key players because teachers can incorporate gamification elements without having to spend money on these activities; for example, by creating a leaderboard poster for their classroom wall. However, we are now seeing players enter this space to formalize these gamification practices and tie them in to institutional reporting systems. One example is ClassDojo, an app which teachers can use to encourage positive behavior. An additional benefit in a digital environment is that solutions like ClassDojo also generate and capture data on student behaviour, which can be shared with other faculty, administrators, and parents.

A number of different types of players are involved with the delivery of games or the use of gaming theory to build content services and solutions. Some work solely on games in the education category, while others play in this space peripherally to their main businesses, which are either in mainstream education or in consumer markets, as Figure 1 shows.

Figure 1. Key Player Types Involved in Games in Education



Source: Outsell analysis

Market Size

Sizing the market for games in education is not easy. Many games are created as elements within a larger product, and measuring the revenues from standalone educational games does not paint a true market picture. In 2012, the NPD Group estimated that the total US consumer spend on video games was $14.8 billion. In comparison, Outsell's research shows that the total US market for educational content in 2012 was $27.4 billion. Games make up an extremely small, albeit growing, proportion of this total.

Key Players

Table 1 lists key players for each organization type. This listing is not intended to be comprehensive, but to provide an indication of some of the more high-profile players in this space.

Table 1. Key Organisation Types and Players Involved in Games in Education

Player Type	Name
Educational publishers	Cengage Learning, Houghton Mifflin Harcourt, Macmillan, McGraw-Hill Education, Oxford University Press, Pearson Education, Scholastic, Triumph Learning
Hardware producers	Amplify, Apple, Microsoft, Nintendo, Sony
Consumer games developers	Activision, Electronic Arts, Microsoft Studios, Mojang (Minecraft)
Educational games developers (working with publishers)	Aptara, DESQ, Hurix, Integra, Jouve, LearningMate, nSight, QBS, Six Red Marbles, Smashing Ideas, WordsandNumbers
Educational games developers (producing their own offerings)	3P Learning (Mathletics), Archipelago Learning (EducationCity), Blue Duck Education (MangaHigh), BrainPOP, Filament Games, Little Bridge, Numedeon (Whyville), Playmatics, Topmarks Education, zondle
Philanthropic foundations	Gates Foundation, MacArthur Foundation, National Science Foundation
Social gaming developers	Mind Candy (Moshi Monsters), Rovio (Angry Birds), Zynga (Farmville)

Source: Outsell analysis

Educational games developed for use in K-12 generally come from one of two sources:

- **Traditional educational publishers:** Usually use games as an element of a broader digital solution. Most large educational publishers can build simple games in-house, sometimes hiring staff from games companies to bolster their expertise. Cengage Learning, for example, hired former Zynga employees. Outsourcing is also common, with publishers focused on the strategic business imperatives behind the creation of the game while the game developer builds a compelling game embedded with the necessary pedagogy. Outsourcing is a good

way for publishers to stay at the cutting edge of new gaming technology developments such as the Oculus Rift virtual reality headset (recently acquired by Facebook), which could, for example, enable children to undertake virtual field trips to destinations such as the pyramids at Giza, which would otherwise be too costly.

- **Dedicated educational games producers:** Usually offer subscription-based solutions, which schools can use to serve a range of different age groups, such as Archipelago Learning with its EducationCity product.

In higher education, the situation is different. Both traditional publishers and dedicated educational games producers serve this market, but games are also developed directly by faculty for specific courses or student groups. One example is Foldit, an online puzzle game about protein folding which was developed by the University of Washington's (UW) Center for Game Science and the UW Department of Biochemistry as part of an experimental research project.

In the professional training space, the market map changes again. In addition to games from traditional publishers and dedicated games producers, some companies commission games dedicated to their specific training needs. For example, UK games producer DESQ created a series of mini games for Lush Cosmetics to train frontline staff on the details of new products for the Christmas season. Online quizzes fed into a leaderboard covering all of the UK stores, motivating staff to improve their knowledge and compete with other stores.

The Competitive Landscape

The competitive landscape regarding games in education is evolving as education becomes more consumer-centric.

Some consumer games developers are entering education through partnerships, such as Pearson's alliance with Electronic Arts for its GlassLab project. Large games companies have generally not found it economically viable to make a significant investment in the development of educational products, but these alliances enable them to reuse existing resources and brands to explore the market opportunity.

Market Dynamics and Key Trends

With this backdrop, the following key trends are driving developments in the games-in-education space:

- **Keeping up with the kids:** Many educators are concerned that students' technology skills far outstrip their own. While this may be true, using games to deliver education provides teachers

with a place to meet students in an environment with which they are already familiar. Large educational solutions providers such as Blackboard and Cengage Learning are closely focused on delivering student-centric services, and games provide a valuable way of demonstrating this focus on the learner.

- **Personalisation:** The free-play nature of many games, which enables players to make their way through a game in many different ways, ties in strongly with current drives to make learning more personalised for the student (which in turn ties into the idea of student-centric services).
- **Big data:** Games can be used to track student progress. In games, players move on to higher levels when they've mastered the necessary skills; similarly, teachers scaffold lessons to deepen understanding as students grasp the easier concepts. Again, this shows the way in which similarities between games playing and learning are driving the development of games with educational outcomes in mind.
- **Mobile technologies:** The personalised nature of games, in general and in education, means that unless each student has his or her own device, it can be very difficult to implement games effectively. As this scenario becomes a reality at many schools, the base for experimentation with games and development of effective solutions grows.
- **Game-based schools:** Some schools are using games and gamification as their primary teaching methods. Examples include Quest to Learn, a New York public school that is a collaboration between the Department of Education, New Visions for Public Schools, and the Institute of Play. Quest uses the underlying design principles of games to create immersive, game-like learning experiences. Games and other forms of digital media are used to model the complexity and promise of real-world systems, and the school believes that understanding and accounting for this complexity is a fundamental literacy of the 21st century.
- **Collaborations:** The education market is a challenging one for games developers to enter because of the small size of the market in comparison with the consumer market, and because of the skills required to add pedagogical elements into existing games or to build educational games from scratch. One key example is GlassLab (see 10 to Watch), a collaboration between Pearson's Center for Digital Data, Analytics & Adaptive Learning, Electronic Arts, the Entertainment Software Association, and ETS. Combining complementary skills from a range of companies means that solutions can be created and piloted, which none of these companies would be able to do alone.
- **Academic and philanthropic involvement:** In addition to corporate collaborations, there is a great deal of academic research and philanthropic funding going on in the games-in-education space. Bill Gates has long believed that the level of engagement seen in children when they are playing video games should serve as a motivator in creating technology that allows teachers to redirect this enthusiasm toward learning. The Gates Foundation has brought together education experts and video-game designers to write plans on how such video game-based programs can go from the idea stage to the classroom. As just one of

many examples of the Foundation's involvement in this area, it is working with the Center for Game Science at the University of Washington on a free online game called Refraction. The Gates and MacArthur Foundations are involved in funding projects like GlassLab, while Gates has also invested in the Center for Game Science and the Radix Endeavor at MIT, which is looking to develop games that embed valid assessment measures.

Opportunities and Threats

Games offer a number of opportunities to creators of educational products and solutions, including:

- **Assessment:** Games allow educators to assess skills which can't easily be tracked with traditional multiple-choice assessments or full-length essay-style questions. These include creativity, collaboration, and persistence, and all are fundamental to successful game-playing. Games are also good at enabling continuous assessment rather than relying on test conditions, reducing pressure on students and providing a fairer indication of their skill levels than a single-snapshot assessment can provide.
- **Big data:** Data from gameplay can be an important element of the overall dataset which can be collected about a single student, and in particular provides insight into those skills which are difficult to assess, as mentioned earlier.
- **Market extension:** Producing services with institutional/consumer crossover potential offers opportunities to businesses targeting the K-12 market. Solutions involving games provide a great bridge between home and school, enabling parents and educators to view progress and encouraging students to engage at home with the same educational solutions that they use at school.
- **Adoption driver:** Many teachers and students are keen to investigate the potential of games in education, but a lack of compelling solutions has held back adoption of suitable devices, which in a vicious circle has then held back the development of solutions. Adding games into the mix helps educators deliver engaging resources to students and could be a valuable driver for the take-up of devices on a 1:1 level in schools.
- **Improving student outcomes:** Solutions providers in all areas of the market are keen to demonstrate that their solutions have a direct measurable impact on student outcomes. The amount of research done on the use of games in education indicates that games are a very good way to engage students and deliver improved outcomes, and Outsell expects to see further research of this sort involving compelling combinations of games and educational activities.

In addition to opportunities, challenges exist for both traditional and emerging players as the market evolves and products change:

- **Suitability:** Many see gaming as a childish pursuit, inappropriate for the serious business of education. Games are therefore better used in K-12 settings than in higher education and

professional training. However, learners across the board learn better when they are engaged and interested, and games provide a great way to help with both of these things. Examples of games in higher education include PaGamO, for which a probability professor gamified his Coursera MOOC to engage students and incentivize them to complete homework problems. Nonetheless, convincing higher-education faculty and human resources of the benefits of games and gamification remains an uphill battle in many instances.

- **Lack of technology access:** Consumer games are ahead of education markets when it comes to gaming equipment. The processing power of gaming consoles puts them at a high price point, which creates difficulties for schools looking to deliver 1:1 devices to students. Gaming also uses devices not commonly found in schools, such as motion sensors (Microsoft's Kinect device is a good example) and virtual-reality headsets such as Oculus Rift. Delivering games in an educational setting which are as compelling as the games students are playing at home can therefore be a financial challenge for schools. This has a knock-on effect, because solutions providers cannot afford to invest in games which schools cannot afford to buy. Consumer games are often priced around $50, a price point which schools cannot meet on a per-head basis.
- **Satisfying multiple demands:** Games designers must be sure to identify organization goals and related metrics as well as trainee goals to understand what motivates core behaviors, particularly in a professional setting. Investment in this upfront analysis is crucial to creating a game which satisfies the needs of the organization, the trainer, and the trainees.
- **Good games are hard to build:** As consumer games developers know, it's not easy to create a great game which keeps players interested by challenging them at the right level with compelling gameplay. In the world of education, there is an additional complication in that the game must also deliver on key educational goals: the challenge is to keep the fun element of the game while ensuring that educational outcomes are at the forefront.
- **Investment:** Consumer games developers spend millions creating updates to successful franchises and setting new challenges for players. The investment required to do that in an educational context may be prohibitive, as the audience size is much reduced. This is even more true in professional training and higher education than it is in the schools market, which is another factor contributing to the relatively low take-up of games in these markets.
- **New skillsets:** The area of games is new to many solutions developers, who either need to build good relationships with external games developers who understand both gaming and the way the education system works, or to recruit an internal team of games developers. Identifying and then attracting the right people can be extremely difficult, and for the time being many players are relying more on outsourcing than on internal games development. Success in the games area depends as much on execution as it does on strategic vision, and building a strong development team both internally and externally is not easy.

10 to Watch

These case studies outline digital services involving games in education developed by major educational publishers and software games manufacturers. We also present case studies of key disruptors and new players, and discuss their potential for growth.

Amplify

At a Glance	News Corp's Amplify delivers hardware, software, and content into the US K-12 market. The business launched in 2012, and in 2013 released a tablet specifically for education. In June 2013, Amplify announced that it would produce more than 30 games aligned to Common Core standards in English Language Arts and in Science, Technology, Engineering and Mathematics (STEM) subjects. Amplify's games will be available for its own tablet and for other platforms. Games may be purchased by US school districts on a standalone basis or bundled with Amplify's digital curriculum solutions, and the games became available at the start of the 2014-15 school year.
URL	http://www.amplify.com
Coverage	US K-12
In Outsell's Opinion	Amplify uses games to help students grasp concepts that are difficult to understand. For example, Common Core standards have placed an increased and earlier emphasis on fractions, a critical foundation for more advanced math concepts. The US government has funded research on more effective ways to teach fractions, and Amplify is looking to do its part with games such as Crafty Cut (a puzzle game in which students can swipe a finger across the screen to cut and manipulate 3-D objects) and Mlob Rule, a strategic puzzle in which players try to combine disparate tribes of Mlobs into whole number units to attack and defend the kingdom. As students advance in the game, they learn to break down a fraction into a sum of fractions with the same denominator, and they learn how to create increasingly complex combinations of fractions that equal one. They also learn that adding and subtracting fractions is simply joining and separating part of the same whole. Addressing specific topics such as fractions is a key strategic imperative for Amplify, as is increasing the time kids spend learning outside the classroom using motivational tools such as games. Amplify's deep pockets mean it can work with well-regarded consumer games creators, but it will have to ensure ROI on the large investment required to build its current games portfolio.

BrainRush

At a Glance	BrainRush is the brainchild of Nolan Bushnell, founder of Atari, who wants to use the ability of games to hold players' attention by making them become more challenging as players' abilities improve, with BrainRush's Adaptive Practice technology (based on game dynamics and neuroscience research) being used to develop compelling educational games with adaptive capabilities. Teachers can sign up for BrainRush for free, set up virtual classrooms, assign any BrainRush game to any student, and monitor the activity and progress of each student in real time. The BrainRush site contains a library of games which can be assigned, and BrainRush is working on mapping these to Common Core standards. In addition, users can create their own games.
URL	http://www.brainrush.com/
Coverage	US K-12, with future international aspirations
In Outsell's Opinion	Nolan Bushnell describes BrainRush as Zynga meets Wikipedia, offering its games for free and generating revenues in alternative ways. The company has a compelling vision but, like other providers of educational games, is battling against the perception of many educators and administrators that games are for fun, while education should be hard work. However, BrainRush realises that games are unlikely to be used by teachers and students at all times, and it just asks teachers to implement BrainRush games in their classrooms for 10 minutes each day and then to evaluate the impact.

DESQ

At a Glance	DESQ is a UK-based developer of interactive learning solutions which works with corporate clients such as Nissan, BP, the Food Standards Agency, and the British Council. Past projects include: • Web interface to help develop staff communication and project management skills for the BP Leadership Foundation; • Immersive learning journey called La Mappa Misteriosa for the BBC to support students learning Italian; • An online course delivered to 73,000 people over three years on Safeguarding and Safer Recruitment for LSIS; • A blended learning solution for UNIDO, with a digital pre-course in logical frameworks prior to face-to-face training; • A children's game for ASDA Money to encourage children to save and to teach them the value of money.
URL	http://www.desq.co.uk/
Coverage	Corporate training
In Outsell's Opinion	DESQ applies game mechanics to a professional business or educational brief. The company is focused on investigating how new devices affect the way people play games, and how adept they are at transferring their skills into a mobile environment. Both game mechanics and design are impacted by the use of new mobile devices, and DESQ is keen to use the device's capabilities to the fullest.

GlassLab

At a Glance	GlassLab is a not-for-profit project founded in June 2012. Founding partners include Electronic Arts, Pearson, ETS, the Entertainment Software Association, and the Institute of Play, while the project has also received funding from the Gates Foundation and the MacArthur Foundation. The aim of the project is to build a body of credible evidence around three hypotheses: 1. Digital games with a strong simulation component may be effective learning environments; 2. Game-based formative assessments may be well suited to detect learning gains and offer ethical assessment environments, insofar as they capture learning in the environment where it occurs; 3. Game-based assessments may yield valid, reliable assessment measures. GlassLab is creating original games and adapting existing commercially successful games like SimCity. All games are aligned to Common Core standards and designed to support acquisition of critical 21st-century skills. GlassLab has two games on offer: • Mars Generation One: Argubot Academy, which helps students to develop persuasion and reasoning skills for STEM and 21st-century careers; and • SimCityEDU: Pollution Challenge, in which students play the role of mayor, solving environmental and town-development problems. In April 2014, GlassLab beta-launched GlassLab Game Services, a toolset to help producers bring games into the classroom by demonstrating their effectiveness, and to help school administrators and teachers use games as ways to gauge student learning. iCivics and Filament Games will be the first to use this toolset in the civics game Argument Wars.
URL	http://glasslabgames.org/
Coverage	US K-12
In Outsell's Opinion	GlassLab's activities connect games to the overall concept of assessment. Formative assessment through games is an area with potential that is still largely untapped, and it will be the key to this next generation of learning games, providing long-term value and driving wider adoption. Developers will need to be able to gather large amounts of data from game play, align this data to critical learning goals for knowledge and skills, and display this in a way that is simple and actionable — GlassLab has already started down this path with SimCityEDU, so it understands the challenges ahead and is well placed to build on its experiences, as well as its valuable partner relationships.

Microsoft

At a Glance	Microsoft is one of the world's largest software providers through its Office suite. It has a long-standing interest in both education and games — Office is widely used in schools, and the company also produces the Xbox gaming console and games for a variety of platforms. In the education space, Microsoft has: • Worked with Sesame Street and National Geographic on the Kinect Playful Learning Initiative; • Undertaken practical experiments with external academic research partners to bring games into the classroom, including a project with Rochester Institute of Technology called Just Press Play, which gamifies college experiences to improve academic outcomes; • Produced Kodu, which lets K-12 students create PC and Xbox games through a visual programming language. Kodu teaches creativity, problem solving, storytelling, and programming, and is used by 1.5 million children worldwide.
URL	http://www.microsoft.com
Coverage	Global K-12, higher education, and professional training
In Outsell's Opinion	Microsoft's existing interests in education and in games make it a natural place for these interests to have coincided. The company has resources to invest in research and acquisitions, as evidenced by the company's recent $2.5 billion purchase of Minecraft creator Mojang, the reach to enable testing of new solutions, partnerships with research institutions and commercial players to develop new offerings, and technical skills to execute strategic plans. Furthermore, investing in this area speaks to the company's philanthropic goals. Outsell expects to see Microsoft become increasingly strongly embedded into the area of developing games for education.

Serious Games Interactive

At a Glance	Serious Games Interactive (SGI) is a developer of games, simulations, and virtual worlds. It has delivered more than 100 games-based solutions to clients including British American Tobacco, Maersk Group, and Siemens. For Siemens, SGI developed a simulation called Power Climber, a web-based training game that takes users through safety, service, and maintenance processes. This product addresses two of Siemens' key needs: they had found face-to-face training too expensive, and e-learning offerings were often divorced from reality.
URL	http://www.seriousgames.net
Coverage	Professional training and K-12
In Outsell's Opinion	Like DESQ, Serious Games Interactive is a developer of training solutions targeted to the needs of individual businesses. However, achieving scale can be challenging when customers are looking to games-based solutions to provide them with a competitive edge over their rivals.

Rovio

At a Glance	Rovio is a Finnish entertainment media company whose Angry Birds game is the most downloaded app of all time. Rovio has used the success of Angry Birds to move into adjacent markets, and it now operates publishing, licensing, and entertainment services in addition to games production. Rovio's new Angry Birds Playground, which spent three years in development, is an educational program for children aged 3 to 6 designed for use by teachers and students in a school environment. The program includes a range of resources (digital content and physical learning materials such as activity books, logic games, and even musical instruments). To ensure that the product works from an educational perspective, Rovio worked with CERN, NASA, and National Geographic, and is implementing a teacher training program.
URL	http://www.rovio.com
Coverage	Kindergarten
In Outsell's Opinion	Rovio has two critical advantages as it moves into the world of education: the strength of the Angry Birds brand, and the connection to the admired Finnish education system. Angry Birds Playground differs from other games in education because it offers an entire program in which games make up just one part. In addition to the valuable connection to the Finnish education system, Rovio will work with the University of Helsinki to research the effectiveness of the programme. This research will feed back into a developmental loop, which Outsell believes will be crucial to the programme's success.

TeacherGaming (MinecraftEdu)

At a Glance	TeacherGaming is a Finnish company founded in 2011 to reinvent how digital games are used in the classroom. The company aims to use impactful games to create compelling educational experiences. It currently runs two projects: KerbalEDU (a joint project with Squad, developer of a game called Kerbal Space Program) and MinecraftEdu (supported by Mojang, the developers of Minecraft, and by E-Line Media, a publisher of game-based learning products and services). MinecraftEdu is a school-ready remix of Minecraft used in more than 3,000 schools worldwide. TeacherGaming offers discounted licenses, a custom edition with features for classroom use, and learning programs to support teachers using MinecraftEdu. TeacherGaming also runs a community for teachers to share their experiences. MinecraftEdu offers the same gameplay as the consumer version of the game, supported by a server which connects students in a multiplayer environment. Teachers can control where students can go, where they can build, and how they interact with the world and each other. Teachers have used the game in a range of subjects including history, math, art, programming, creative writing, science, music, digital citizenship, and religion. For example, students of an English-language teacher in Denmark could play MinecraftEdu but only if they communicated in English, while a teacher from California used MinecraftEdu to teach students about gravity.
URL	http://minecraftedu.com/
Coverage	K-12
In Outsell's Opinion	The open-ended nature of MinecraftEdu makes it easy for educators to fit into their lessons. To support this, TeacherGaming's community and professional development for teachers enables them to learn how to do this effectively and to share best practices. For TeacherGaming, the number of students already playing the consumer edition of Minecraft is a valuable business driver — and getting educators to catch up and work out how to best use the program in their classrooms is the major barrier. The community is well-placed to reduce that barrier.

Triumph Learning

At a Glance	Triumph Learning is a publisher of K-12 instructional and supplemental resources which align with state standards and Common Core standards. In July 2014, Triumph Learning launched GET Waggle, a digital practice solution for grades 3 to 8 in math and English Language Arts which incorporates both games and gamification elements. Triumph Learning worked with games developer Smashing Ideas to build the digital games to access their expertise in gaming theory and development.
URL	http://www.triumphlearning.com
Coverage	US K-12
In Outsell's Opinion	Games within products like GET Waggle are increasingly similar to the consumer games to which K-12 students are already accustomed, and where they demonstrate real perseverance to achieve their goals. Triumph Learning provides a great example of a traditional player choosing a group of partners (Triumph also worked with Knewton, Clever, and others to build GET Waggle) to complement its strengths. In addition to integrating games into the core of learning activities, Triumph Learning has also worked on data integration, informing the teacher about students' cognitive development as they play — this is another vital component to the successful implementation of games in education.

zondle

At a Glance	zondle is a UK-based creator of customisable educational games. Teachers use the platform to create their own questions, or choose from more than 2 million questions already created by other zondle users, and hosted on the zondle site. Any topic can be embedded into any zondle game. zondle games are intended to engage users, encouraging them to practice, review, revise, and memorise the material. Teachers can use the games in a whole class environment on their whiteboards or they can assign the games to students individually, and also have access to a dashboard showing the progress of individual students. The aim of all zondle games is to support teachers by using game techniques to give their classroom a lift at appropriate points, or set games for homework.
URL	http://www.zondle.com
Coverage	K-12
In Outsell's Opinion	zondle's games focus first on educational goals, and the games seem rather simplistic in comparison to consumer video games. However, zondle's approach is grounded in the reality of the classroom, addressing specific teacher needs. For example, games which take too long to play are hard to integrate into a classroom environment, so zondle's are necessarily quite short.

Essential Actions

Games in education offer potential for improved learning outcomes for students, and business opportunities for solutions providers. Players looking to operate successfully in the games and gamification segment of the education market must be aware of a range of factors.

✓ Collaborate, Collaborate, Collaborate

Collaboration is vital in the games-in-education space because of the range of skills required to develop compelling solutions. Solutions producers must be able to execute effectively on a strong strategic vision through cutting-edge academic research and expertise in gaming design, and by embedding pedagogy effectively into games. Collaboration can be valuable in terms of investment, with large philanthropic foundations offering large grants to companies willing to experiment in this area.

✓ Identify the Role of Games

Producers must decide whether they are building solutions around a gaming core, in which games dominate the product, or whether games make up a limited proportion of a broader offering. To make this decision, solutions providers must identify what role they want games to play, what results these games are expected to produce, and what existing solutions are available that might benefit from the addition of games or gamification.

✓ Consider the Needs of All Users

Users interested in games in education include students, educators, administrators, institutions, corporations, and parents. Educational games developers must be aware of all of these participants and build products which speak to the needs of all users. Students, for example, want a game that is fun to play, educators want a game that improves learning outcomes, parents want to track their child's progress, educational institutions want a return on their investment in the product, and corporations want to ensure that any training games reflect their corporate culture in addition to delivering effective learning. Addressing this range of needs in a single product is not easy, but failing to address any of these key needs will leave a product floundering.

✓ Identify the Purpose of the Game

It is important to place limits around a game offering, and not to try to boil the ocean in a single product. For example, a game might be designed to provide a fun way for students to practice their times tables, or to help them learn a complicated concept like fractions more easily, or to assess their competencies in collaboration and problem-solving. Delineating the purpose or purposes of a game is vital to ensuring manageable product development.

✓ Provide Evaluation Tools

Games are a new tool for many educators, and it is important to provide those educators with the means to assess their efficacy. Not only will this help educators understand how to use the product most effectively, but it also gives them information to help when making a product renewal decision, if that is the business model the game has used.

Related Research

Outsell clients can click *here* for more information on the companies analyzed in this report.

Reports

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