# Social Learning and Gaming

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In this document we attempt three things:

1. To elaborate the scope of the research agenda related to the topic of "Social Learning and Gaming";
2. To make ten recommendations to funding bodies about what research is necessary to optimise the research agenda;
3. To provide an illustrative scenario of what quality, research-based Social Learning through Gaming might look like in 2030.

## *1.* Scope of the research agenda

Our agenda revolves around "Social Learning and Gaming". This raises the question of what is the relationship between social learning and gaming: what connects them and where do they differ? We provide an overview of the agenda in this section buy focussing on (a) Social Learning; (b) Gaming; and, (c) cross-cutting issues between the two.

### *1a.* Social learning

*"What makes social learning work?"* Individuals can rarely single-handedly solve major problems. Within education, specific forms of social interactions, often called "dialogic", have been robustly demonstrated to be effective for engaging students with higher-order thinking and the development of "soft skills" (Johnson and Johnson, 1989; Mercer and Littleton, 2007; Soller, 2002). Mechanisms that explain the power of social learning have been identified, including the roles of peer pressure and knowledgeable others. Consequently, we can take the desirability of certain forms of social learning as a given. Moreover, we assert that non-social forms of learning, such as a student working alone through a textbook, are over-represented in current education systems. *We envision that social learning become more valued and more fairly represented in educational practice.* However, social learning, and assessment of the higher-order thinking and "soft skills" it can promote, complicates things for students, teachers and researchers, and the type of social learning that is possible or desirable is no simple issue.

*"What is the relationship between individuals when learning together?"* There are two views of social learning implicit in the contemporary literature, and they are not obviously compatible. The term "personalisation", which remains popular with researchers and policy makers, carries shades of "mass customisation" and "consumer choice", in which individuals are viewed as rational agents who can and should make decisions for themselves. Conversely, appeals to Vygotsky and social-culturalism are equally popular and carry shades of collectivism and enculturation. Often in a given educational technology document both these perspectives are implicit, unchallenged and in apparent contradiction. We argue that they must be explicitly admitted, and harmonised. One view is that new students initially learn from knowledgeable others; in turn they go on to become the knowledgeable others to new students. *We envision the student in the role of both apprentice and expert.*

*"Whose knowledge is it anyway?"*Another term common amongst educational technologists is "community". Social learning includes an individual learning within a community; communities constructing knowledge; and communities learning from one another. School students clearly do not construct original knowledge in the same way as a research community, but can learn from community-based project work (Johnson and Johnson, 1994). *We envision the teacher as a*

*knowledgeable facilitator of a community of learners*. Moreover, teachers themselves can use new technologies to become themselves members of a community of practice and inquiry, and we see this as essential to their transformation from transmitters of knowledge to facilitators of learning.

***1b.*** **Future of EdGames research**

Although there is no shortage of voices promoting the promise of games for learning, a number of recent reviews on the efficacy of educational games for learning report mixed and fragmented results (CITE). Two frequently made claims are that games are inherently more *motivating* than traditional computer-based learning environments (CITE) and that skills exercised in modern massively-multi player on-line games (MMOGs) *transfer* to the real-world. These typically include ill-structured skills, such as leadership, negotiation, and communication (e.g., JSB/WoW). Although the arguments are compelling and intuitive, there is to date little evidence to support them. Modern games are also often claimed to engender a sense of presence, or "being there", but little empirical work has been done that connects presence to learning. We view these empirical questions as answerable within the next 20 years, and that they suggest new directions for learning science researchers to explore. Clear answers to these questions will allow practitioners to make more informed decisions about when immersive environments are appropriate, when they may hinder learning, and at what kinds of realism is necessary for learning.

Far transfer is the goal of any educational endeavor. Of course, there are very few examples (ANY?) of any instructional interventions succeeding in this endeavor. Games must be held to the same standard. Within 20 years (likely earlier rather than later), we believe it will be possible to instrument the real-world in ways similar to how computer-based learning environments are instrumented, which will increase our chances to detect far transfer. An examples of this includes automated conversational and possibly physiological tracking (e.g., to detect good listening skills and non-verbal behaviors for a leader). These questions should be considered within a broader understanding of immersion that go beyond just video games – for example, emotionally charged and compelling movies or books may be just as effective at generating levels of immersion that increase presence, sustain motivation, improve memory encoding skills (e.g., we remember better with emotional engagement), and promote far transfer. It may be that tools exist in other communities (such as psychology) that may enable more accurate determination of far transfer. Again, these are empirical questions we believe are answerable within 20 years.

We have described a largely empirical future for educational games research, which is appropriate. For example, large numbers of educational games have been developed in the commercial sector and from research labs with limited or no evaluations. Commercial games drive many of the graphics and sound advances. Other areas of AI research contribute to better educational games, such as intelligent techniques for stealth assessment (cognitive modeling), guidance (intelligent tutoring), and identification of productive and non-productive learner behaviors (educational data mining), to name a few.

***1c.*** **Cross-cutting issues between social learning and games**

In 2030, we have dealt with two major cross-cutting issues that effect both social learning and games: immersion and motivation. We have explored whether the feeling of being immersed in a social learning environment creates differing behavior in that environment. For example, we can show whether there is a connection between someone's feeling of immersion and whether they are more or less likely to take on their expected role in a group or team. Similarly, we can show whether this same type of immersive experience within a gaming environment leads to better/deeper learning when using educational games. This helps inform our decision making about how much time and effort are necessary to spend creating life-like, compelling experiences for social learning environments and

games. If higher levels of immersion are shown to have strong positive results ( promoting more sincere involvement in social situations, promoting better transfer or retention of knowledge from serious games), we will expend significant research energy on the types of technologies that can create immersive experiences. If immersion is shown to have little effect on involvement/learning, we will focus our research effort elsewhere.

By this time, we will also better understand how social learning environments and games effect motivation for students to participate/learn. We will have solid evidence about how pure entertainment games manage to create such a deep intrinsic motivation that hooks users for such a long time and with such passion. We can apply this understanding to educational serious games. Similarly, we identify the factors involving social learning that motivate students. These include the idea of pressure to perform well that comes from peer review and team commitment/ sense of duty to community. We have explored different methods of making this motivation explicit and promoting this motivation through tools or acknowledgment/social status changes that reward students for participating in positive ways (being a helper/ finding the right helpers). We have shown that these explicit rewards create more motivation in social learning environments. In both these social learning environments and games, we test definitively whether increased motivation leads to improved learning (deeper knowledge, better transfer, quicker uptake, etc.). Again, we use this information to decide how much effort we should expend on building systems that motivate students.

## *2.* Recommendations

Not all these suggestions are new, there already exists a body of literature that addresses some of them to a certain extent, but we don't yet have the answers and/or these questions can now be explored in new ways.

1. We recommend that [funding agent] support research to identify the underlying properties of games and social learning environments that can support deep Conceptual Knowledge.
    a. What is the relationship between deep conceptual knowledge and soft-skills;
    b. What is the relationship between deep conceptual knowledge and higher-order thinking skills;
    c. What is the relationship between deep conceptual knowledge and ill-structured problems.

    The world would be a better place as a result, because as games & social environments grow in popularity, we should understand what benefits they really offer.

2. We recommend that [funding agent] support research to develop scientific understanding of the relationship between *immersion* and *learning*.
    a. We recommend that [funding agent] support research to develop scientific understanding of the factors that contribute to feelings of immersion and presence, such as realism, engagement, narrative content, sincere involvement, etc.

    The world would be a better place as a result, because it would offer evidence to support what is currently a 'faith'.

3. We recommend that [funding agent] support research to develop new and possibly more appropriate definitions of transfer. To test the hypothesis that what happens in games and social learning environments is a closer match to what happens in the real world and therefore leads to more opportunities for far transfer.
    a. How can we use a combination of cognitive research instruments and real world data (Interaction Patterns, Ethnographic data,) inside and outside games and social learning environments to inform the debate about *the concept of transfer*.

The world would be a better place as a result, because it would address a well recognised concern and a need to be able to use what is learnt to operate in the real world.

4. We recommend that [funding agent] support research to identify new methods and contexts for Assessment for Games and Social Learning environments
    a. Participation: is learning and rate of growth a result of deep and meaningful contributions to the community, such as bulletin board posts, providing help to others, seeking help;
    b. The potential for re-enactment as a demonstration of deep knowledge;
    c. Group interactions, management, planning, leadership, peer reviews, role modelling.

   The world would be a better place as a result, because it would enable us to finally move beyond the individual testing of SHALLOW, factual and procedural knowledge, U.S. 'no child left behind' paradigm.

5. We recommend that [funding agent] support research to identify what is motivating about games,
    a. "Leveling up" - What is it about games that makes people spend so long upping their skills level. Could this reduce the 10,000 hours needed to gain expertise?

   The world would be a better place as a result, because it would increase our understanding of why gamers voluntarily engage in drills and how we can harness this underlying force for learning. It could also lead to efficiency gains and help learners appreciate the value of hard work.

6. We recommend that [funding agent] support research to investigate the relationship between individual learning and social learning through tracking interactions over time inside and outside games and social environments.
    a. When is the time for isolated skill practice (e.g. "time for thinking")?
    b. When is it time for team interaction (e.g. "time for working with others")?

   The world would be a better place as a result, because it would provide evidence to hone individual existing instincts, supporting continued engagement with learning and promote effective lifelong learning.

7. We recommend that [funding agent] support research to identifying what it means to be an individual in a technology-mediated learning community.
    a. Identify the roles, for example: seeking help, giving help, leading, scaffolding, helping helpers, recognise skills and value of others;
    b. Identify when it is appropriate to conform and when to break new ground?

   The world would be a better place as a result, because it would make learning with and from a community more efficient, promote the development of 'soft' skills and resolve the tension between personalisation and community.

8. We recommend that [funding agent] support research to identifying what it means to be a productive technology-mediated learning community?
    a. How do we represent knowledge: including emergent knowledge, accumulated knowledge;
    b. How can we design complex systems that support multiple complex goals, activities and members any or all of which may be in conflict?

   The world would be a better place as a result, because it would make the learning of a community more efficient, explicit, teachable and re-usable.

9. We recommend that [funding agent] support research to uncover unpublished examples and conclusions from practitioners in the areas of games and social learning.
   The world would be a better place as a result, because it will save us re-inventing the wheel.

10. We recommend that [funding agent] support research to conduct a meta analysis across all these recommendations to identify properties that can be applied to learning more generally.

***3.* 2030: A scenario**

Science – hypothesis setting – semester assignment design and build a space ship – stepping into and out of immersive social learning environment - build a 'better' human – social issues re what better means – science re. how particular organs could be more efficient – personal genomics re personalizing your health and designing babies – would individuals specialize – would peers judge your contribution – chance to step out as an individual – to work in sub-groups – get back together and discover the parts don't fit together. Interdisciplinary, ill-structured, vestigial/residue features – evolution – support community for the inquiry process – group work – division of labour – division of resources - gaming analogy – spontaneity – teacher involvement – serendipity – invention as preparation for future learning –

The above scenario can be related to the "Recommendations" listed in Section 2 in the following way:

1. HOTS – task assignment – critical assessment of peers work – accuracy of taking on an appropriate challenge, ability to seek and provide health – reflective awareness – tracking technology to explicitly prompt with timely interventions. Rich environment – simulation to challenge learners. Invent – experiment then critically evaluate;
2. Some learners choose to use the immersive exploratory environment where they can visually explore the simulation of their experiments (*Fantastic Voyage*). Others take a more analytical approach;
3. Training for future biologists as the simulation is incredibly realistic and lifelike (i.e. very similar to real images of real exploration of the body);
4. The student is evaluated not only by their product, but by their team work, methodology of experimentation. In line with current assessment of teamwork. Includes real time peer review feedback of teammates;
5. The underlying properties that provide motivation to experiment and practice in gaming environments have been implemented to create interest and motivation in this experimental system;
6. Someone is tasked with lungs: they choose to enter a research/experiment phase to inform their group work;
7. Different people are tasked with different roles within the building process. New students are urged by the system and team to conform with current methods until they reach a more expert level;
8. This environment is realistic and expansive enough include new research results from genuine experimentation;
9. n/a
10. n/a