Can smartphones make people smarter?

Challenges and opportunities for the design and use of mobile educational games

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New media, old questions…

www.xkcd.com

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Serious games

"A serious game is a game in which **education** (in its various forms) **is the primary goal**, rather than entertainment" (Michael & Chen, 2006, p. 17)

"Serious games have more than just story, art, and software, however. (…) They **involve pedagogy**: **activities that educate or instruct**, thereby **imparting knowledge or skill**. This addition makes games serious" (Zyda, 2005, p. 26)

"As a starting point we define serious games as any form of interactive computer-based game software for one or multiple players to be used on any platform and that has been **developed with the intention to be more than entertainment**" (Ritterfeld, Cody, & Vorderer, 2009, p. 6)

"games with a **purpose**" (Watt, 2009, p. 374)

"games with a **purpose beyond play**" (Klopfer, Osterweil, & Salen, 2009, p. 20)

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Gamification

"Gamification refers to: a process of **enhancing a service with affordances for gameful experiences** in order to support users' overall value creation." (Huotari & Hamari, 2012, p. 3)

"Gamification is the **use of game design elements and game mechanics in non-game contexts**" (Domínguez et al., 2012, p. 380)

Serious Games & Friends I
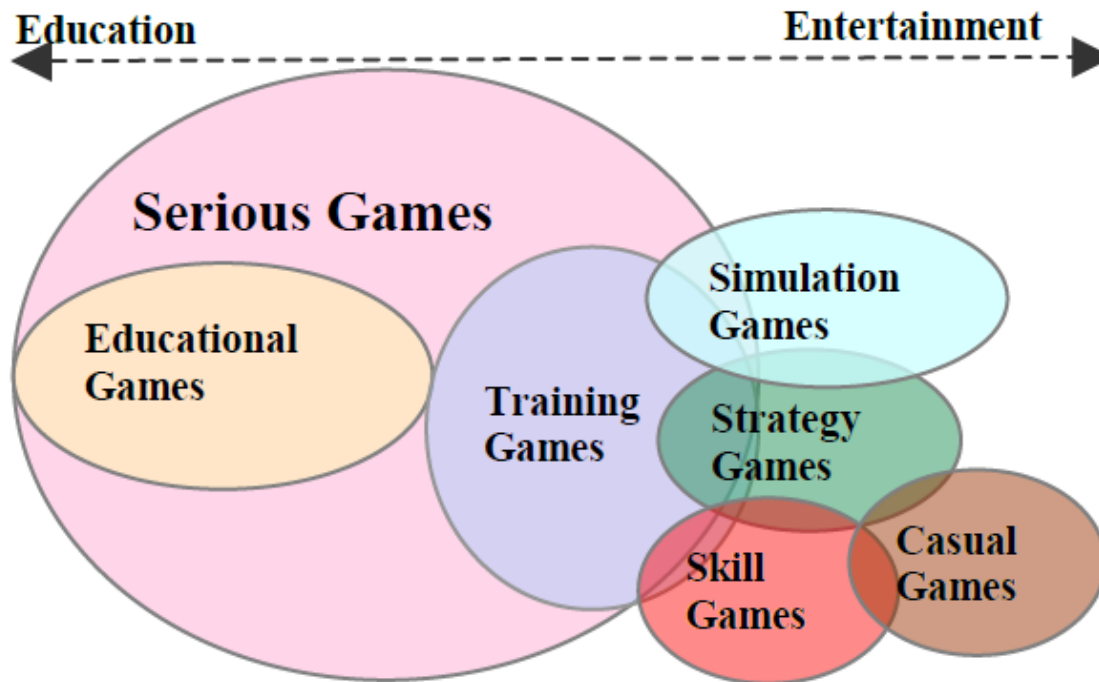
Rankin & Sampayo Vargas, 2008, p.3

Serious Games & Friends II

Breuer & Bente, 2010, p. 11; Kröger & Breuer, 2011, p. 126

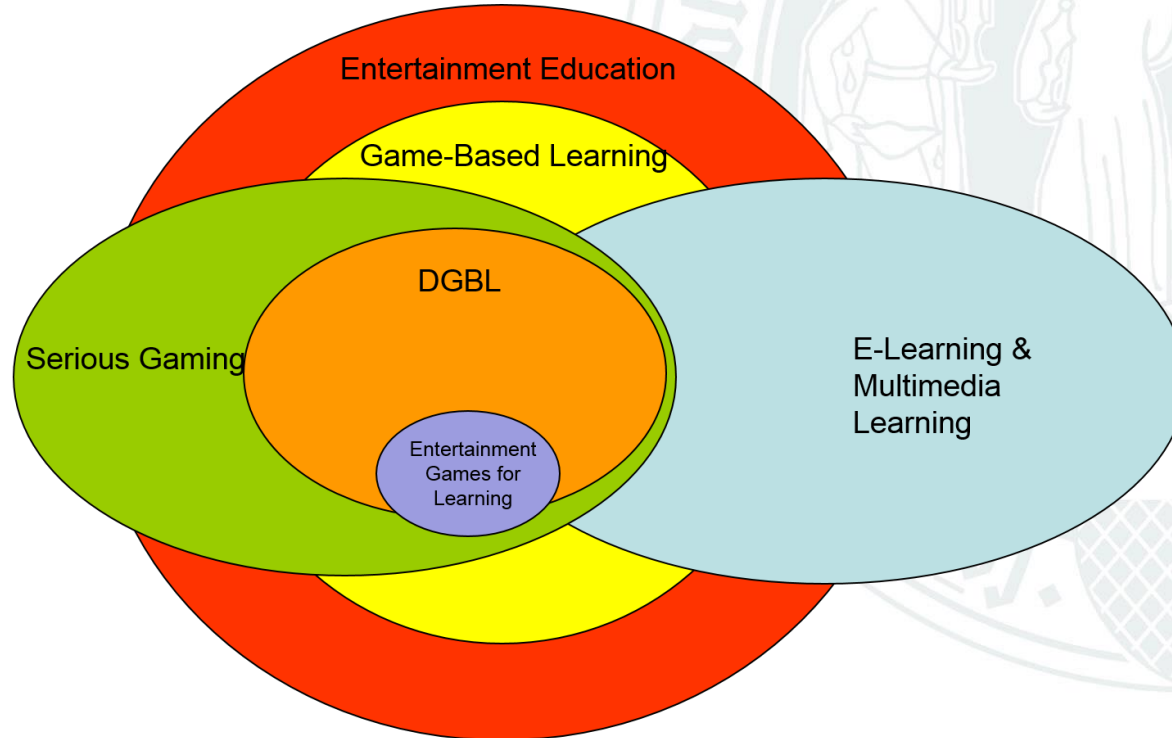**Challenges and opportunities for the design and use of mobile educational games**
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Where does gamification fit in?

	Game	Serious Game	Game for Learning (G4L)	Game-Based Learning (GBL)	Gamification
Basic Definition	This term includes all the other categories *except* gamification.	A game *designed* for purposes other than or in addition to pure entertainment.	A game *designed* specifically with some learning goals in mind.	The process and practice of learning using games.	The use of game elements in a non-game context.
Purpose	Can be for any purpose.	Change in behaviour, attitude, health, understanding, knowledge.	Normally connected with some educational goals.	**Not a game** - this is an approach to learning.	Often used to drive motivation, but can also be used to make something more playful and gamelike.
Primary Driver (why used)	Can be either play or rewards (or both).	To get the message of the game.	To learn something.	To improve learning.	Depending on how it's implemented, it can tap into extrinsic or intrinsic rewards (or both)
Key Question	Is it fun?	Is it engaging?	Is it effective?	Is it effective?	Business: Does it improve profits? Education: Is it effective?
Focus	Player Experience (how)	Content / Message (what)	Content / Message (what)		User Experience (how)

Becker (2015): http://minkhollow.ca/beckerblog/2015/06/21/games-vs-game-based-learning-vs-gamification-my-version/

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Adding mobile

- Mobile…
  - educational games
  - serious games
  - game-based learning
  - gamification
  - …

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Popularity of mobile games

- change of/in media use: **permanently online, permanently connected** (POPC; Vorderer, 2015)

- according to BITKOM (2014): **smartphone = most popular gaming platform in Germany**
  - 78% of people who play games (also) play on smartphones

- 25% of German children aged 6 to 13 own a smartphone (KIM study 2014)
  - **61% play mobile games at least occasionally**

- 92% of German teenagers aged 12 to 19 own a smartphone (JIM study 2015)
  - **76% play mobile games at least occasionally**

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The case of *QuizClash*

- **mobile quiz game** for Android, iOS, Windows Mobile

- original (Swedish) title: *Quizkampen*; German title: *Quizduell*

- available in **11 languages**, **downloaded more than 23 million times** via the Google and Apple stores until March 2014 (source: Wikipedia)

- database with around 30.000 questions (German version)

- even had its own show on German TV for a while

- **one-on-one duels** between players

  – **6 rounds**, **3 questions** per round: **4 options**, **20 seconds** per question
  – players alternately **choose one of three categories** (19 in total)
  – **scoring system** based on **ranking of players**
  – integrated **chat function**
  – players can submit their own questions

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Why is *QuizClash* so popular?

- basic version is **free**
- **simple to use** + **short duration** of duels
- duels against **other players** (e.g., friends & family)
- ranking → **competition**
- test of general knowledge

- option to submit own questions?
- learning?

Mobile games for learning (MG4L)

- (potential) application areas
  - K12 education (a.k.a. primary & secondary)
  - higher education (e.g., university)
  - vocational training
  - awareness campaigns
  - …

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Advantages of MG4L

- **reduced** production **costs** (in comparison to console or PC games)
- **availability of/access to devices** (student ownership of smartphones)
- learning in the **classroom**, **at home** or virtually **anywhere** else → self-directed learning
- use of additional **(user) data** (and sensors) is possible: e.g., location or movement

Challenges in the design of MG4L

- development for **multiple OS and devices** (e.g., smartphone vs. tablet)

- restrictions of **small screens** and computing power

- rapid **technological development** (e.g., new sensors or network standards)

- need for **mobile internet** connection?

- **privacy**/data protection

- licenses, **rights**, & **distribution**

- (sustained) **support**

Challenges in the use of MG4L

- (optimal) **balance between "purpose beyond play" and enjoyment/entertainment**
- **chocolate broccoli problem**
- **transfer**
- **compulsory vs. voluntary use**
- **in the classroom** vs. **at home**/elsewhere
- long-term **motivation**
  - (additional) incentives?
  - evidence for payoff?

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Existing work on MG4L

1. Focus on **technology/design**, e.g.:
   – development and testing of a mobile learning games framework (Busch et al., 2015)
   – pedagogy-based recommendations for the design and choice of educational apps (Hirsh-Pasek et al., 2015)
   – content selection in spaced repetition games (Schimanke et al., 2013)

2. **Case studies** of specific games, e.g.:
   – historical knowledge (Huizenga et al., 2009)
   – English as a second language in primary school (Sandberg, Maris, & de Geus, 2011)
   – problem-solving skills for secondary education (Sánchez & Olivares, 2011)

3. **Few reviews**/overviews, e.g.:
   – evaluation of mobile learning projects (Frohberg, Göth, & Schwabe, 2009)
   – research on and with mobile SG & GBL (Hoblitz & Müller-Lietzkow, 2012)

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Potentials effects of (M)G4L

- creating **awareness**

- sparking/generating **interest**

- increase **motivation**

- enhance/repair **mood**

- satisfy **needs** (e.g., competence or relatedness)

- improve **learning** outcomes (e.g, knowledge or skills)

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The effects funnel

Attention ► Interest ► Attitudes ► Behavior

Design vs. use

"From serious games to **serious gaming**"
(Jenkins et al., 2009)

↓

Mobile?

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Emotional and motivational effects

- several studies have shown that digital games can…
  - be used to **improve/repair mood** states (e.g., Bowman & Tamborini, 2012; Rieger et al., 2014)
  - increase **productivity** (Reinecke 2009a, 2009b)
  - satisfy **basic human needs**, such as competence, autonomy or relatedness (e.g., Tamborini et al., 2011; Rieger et al., 2014)

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QuizClash & mood repair

- **experimental study** (BA thesis co-advised by Diana Rieger and me) on *QuizClash*, mood repair, and motivation ($N = 99$)
  - **positive or negative feedback** in general knowledge test
  - *QuizClash* **against another participant (win vs. lose)**
  - main DV = **mood** (valence, arousal, dominance) & **motivation** (for a similar or dissimilar task)
  - **preliminary results**:
    - winning increases mood repair after negative feedback
    - increased motivation for similar task after negative feedback & winning

  - **replication/additional data collection at Osnabrück University** (BSc thesis advised by M. Rohangis Mohseni)

Project Quizard

- development and evaluation of a **mobile quiz game for higher education** (university)

- funded by the **University of Cologne** (Innovations in teaching program): winter term 2015/2016 – winter term 2016/2017

- cooperation with the Competence Center E-Learning of the University of Cologne and the university clinic (clinical chemistry) + informal cooperation with University Osnabrück

- integration with the e-learning platform **ILIAS**

- **authoring tool** for teachers

- mobile app for **Android & iOS**
  - *QuizClash* as a template

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Quizard research questions

1. Does the **use of a mobile quiz app** positively affect motivation, interest in the topic, and learning?

2. Will it increase learning motivation and outcome if **explanations for the correct answers** are provided (in case of incorrect responses)?

3. Does the **option to play against other students** (from the same class) improve learning motivation and outcome?

We're not the only ones…

Das ILIAS-MobileQuiz: Ein Tool für Präsenzlehre und Selbststudium

Das MobileQuiz der Uni Mannheim ist ein Plugin für ILIAS, das neben Umfragen in der Präsenzveranstaltungen auch das selbstgesteuerte Lernen zur Prüfungsvorbereitung unterstützt. Dipl.-Hdl. Melanie Klinger und Dipl.-Wi.-Inform. Daniel Schön stellen im Video Einsatzmöglichkeiten des Quiz vor.

Das MobileQuiz der Uni Mannheim ist ein Plugin für ILIAS welches Umfragen in der Veranstaltung mit Hilfe der mobilen Endgeräte der Studierenden ermöglicht.

Das MobileQuiz erscheint den Lehrenden als reguläre Funktion im Lernmanagement-System ILIAS und muss daher nicht gesondert installiert werden. In der ersten Einsatz- und Evaluationsphase war es nur für Wissensabfragen und Meinungsumfragen in der Präsenzphase gedacht. In der zweiten Phase wurde es dann als "HomeQuiz" auch zur Vorbereitung der Studierenden auf die Präsenzphasen eingesetzt. In dieser Phase wurde zudem eine Rückmeldefunktion eingearbeitet, damit das System Studierenden mitteilt, ob sie falsch oder richtig geantwortet haben. Für die Entwicklung des Systems in Sachen Didaktik und Technik sind Dipl.-Hdl. Melanie Klinger und Dipl.-Wi.-Inform. Daniel Schön von der Universität Mannheim verantwortlich.

Dipl.-Hdl. Melanie Klinger ist Leiterin der Arbeitsstelle Hochschuldidaktik der Universität Mannheim. Zuvor war sie wissenschaftliche Mitarbeiterin am Lehrstuhl für Wirtschaftspädagogik der Universität Mannheim. Ihre Arbeitsschwerpunkte liegen in der Konzeption und Durchführung hochschuldidaktischer Weiterbildungen, Workshops und Beratungen zu den Themen Motivation, Assessment und Evaluation. Sie forscht u.a. zur Qualität von Lehre sowie zum Einsatz von E-Learning in der Hochschullehre.

Dipl.-Wi.-Inform. Daniel Schön ist Doktorand am Lehrstuhl für praktische Informatik IV der Universität Mannheim und Projektleiter für die Einführung des Campusmanagement-Systems HISinOne am Rechenzentrum der Universität. Seine Interessen liegen insbesondere im Bereich Audience Response Systems (ARS), Learning Games, Learning Analytics und mobiles Lernen.

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psyq – Entwicklung eines App-Systems zur spielerischen Wissensvermittlung und deren Verknüpfung mit psychologischen Fragebögen am Beispiel des Android-Frameworks

Masterarbeit – Dokumentation

2015

canudo
Wissen interaktivieren

MEDIEN   DIALOG   EMOTION   TECHNIK   AKTEURE

19 JAN   SPIELEND LERNEN PER QUIZ APP

ZUR STARTSEITE // ALLE NEUIGKEITEN

QUIZ APP
VERMITTELN SIE IHR FACHWISSEN SPIELERISCH DURCH WISSENSDUELLE.

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ILIAS Quiz

❖ Quizzard Test-Test

Zur Startseite   Weiter

Frage 1 von 10
_____

Welche dieser Annahmen über Medien trifft auf den Uses and Gratifications-Ansatz zu?

○ Dienen primär Bedürfnisbefriedigung

○ Selektion geschieht aktiv und zielgerichtete

○ Programmselektion geschieht unbewußt

○ Dienen ausschließlich Informationsgewinnung

Zur Startseite   Weiter

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ILIAS Quiz user data I

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ILIAS Quiz user data II

AGGREGIERTE TESTERGEBNISSE
(1 - 6 von 6)

Ergebnis	Wert
Gesamtzahl der Personen, die den Test gestartet haben	4
Gesamtzahl aller beendeten Tests (Benutzer, die maximale Anzahl Passes eingereicht haben.)	3
Mittlere Bearbeitungsdauer aller Tests	00:06:47
Gesamtzahl der bestandenen Tests	3
Durchschnittliche Punktezahl der bestandenen Tests	7.00 von 10.00
Mittlere Bearbeitungsdauer aller bestandenen Tests	00:09:02

(1 - 6 von 6)

DURCHSCHNITTLICH ERREICHTE PUNKTEZAHL
(1 - 20 von 20)

Zeilen ▾

Fragen-ID	Fragentitel ↑	Punkte	Prozentsatz	Anzahl der Antworten
1375673	Schlüsselbegriffe und Konzepte 1	1.00 von 1.00	100.00%	2
1375682	Schlüsselbegriffe und Konzepte 10	0.00 von 0.00	0.00%	0
1375683	Schlüsselbegriffe und Konzepte 11	0.75 von 1.00	75.00%	4
1375684	Schlüsselbegriffe und Konzepte 12	0.50 von 1.00	50.00%	2

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Next steps in the project

- **evaluation of the web quiz**
  - experimental **manipulation of feedback**: a) # of correct answers at the end, b) # of correct answers and correct answers + short explanations for questions that were answered wrongly, c) direct feedback after each question

- development of the **mobile app**
  - 1st **evaluation in a field phase** in media psychology classes targeted for summer term 2016

Future directions

- quiz app (+ content) for **students with other majors** (and at other universities?)
  - integration with University of Cologne app
  - integration with other e-learning platforms?
- (international) **collaborative project on mobile learning games**
  - e.g., Horizon 2020: ICT24 – 2016 Gaming and gamification
- establishing an interdisciplinary and international **research network on mobile games for learning**

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