

Learning Analytics & Gamification

Prof. Dr. Eric Schoop,
Alexander Clauss, Mattis
Altmann



Co-funded by the
Erasmus+ Programme
of the European Union



Agenda

1. **Learning Analytics Basics**
2. **Usage of Learning Analytics**
3. **Gamification Basics**
4. **Designing Gamification**
5. **Gamification Elements**
6. **Conclusion**



1 Learning Analytics Basics

Roots of Learning Analytics

“Who talks to whom about what, and with what effect?”

Paul Lazarsfeld, 1944

- Network analysis
 - Social network analysis since 1970's (Wellman)
 - One main finding: we gain more knowledge from weak links in our social network rather with tight links due to the approximation of knowledge with the tight connections
- Benefit of diverse social networks
- Tracing how learner develop knowledge (Corbett, Anderson, 1995)
 - Knowledge discovery in databases (or Data Mining) (Fayyad, 1996), closer to Educational Data Mining
 - Appropriation of business intelligence concepts by educational institutions



1 Learning Analytics Basics

Distinguishing between terms and concepts

Learning analytics, educational data mining, and academic analytics are closely related concepts (Bienkowski, Feng, & Means, 2012; Elias, 2011)

Educational Data Mining

- Developing and implementing methods with the goal of discovery
- Better understanding educational settings and learners (Beinkowski, Feng & Means, 2012)
- Educational data mining uses data mining algorithms with the objective of solving educational issues (Romero, Ventura, 2010)

Academic Analytics

- Application of principles and tools of business intelligence to academia with the goal of improving educational institutions' decision-making and performance
- Combines “large data sets, statistical techniques, and predictive modeling” (Campbell et al., 2007, p.42)



1 Learning Analytics Basics

Distinguishing between terms and concepts

Social Learning Analytics

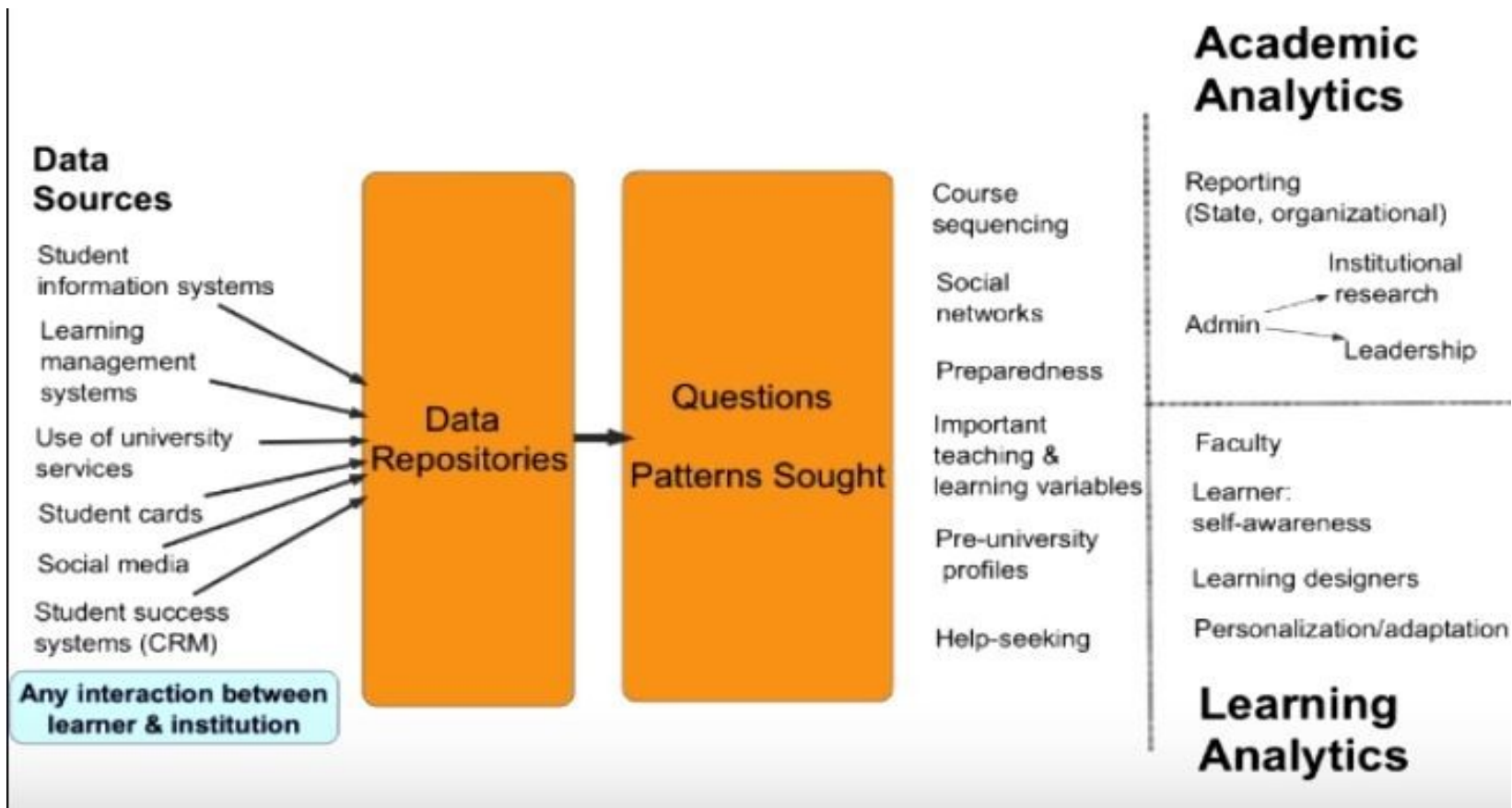
- How learners build knowledge together in their cultural and social settings
- In context of online social learning both formal and informal educational environments are taken into account
- Focuses on the collaboration and interaction of learners in a socialized learning environment, not just on individual learning outcomes (Buckingham Shum & Ferguson, 2012)
- Shift from summative to formative assessment
→ From evaluating learning outcomes to continually assessing the process/progress



1 Learning Analytics Basics

Distinguishing between terms and concepts

Systemic view



2 Usage of Learning Analytics

Why Learning Analytics?

Higher education context

- Increases awareness of learners and educators in their current situations that can help them make constructive decisions and perform their tasks more effectively
- Tracking and predicting learners' performance as well as identifying potential problematic issues and students at risk
- Example: Purdue University used predictive modeling based on data collected from the course management system to identify students at risk and provide intervention
- “Whatever you can’t process in your head is worth learning analytics”



2 Usage of Learning Analytics

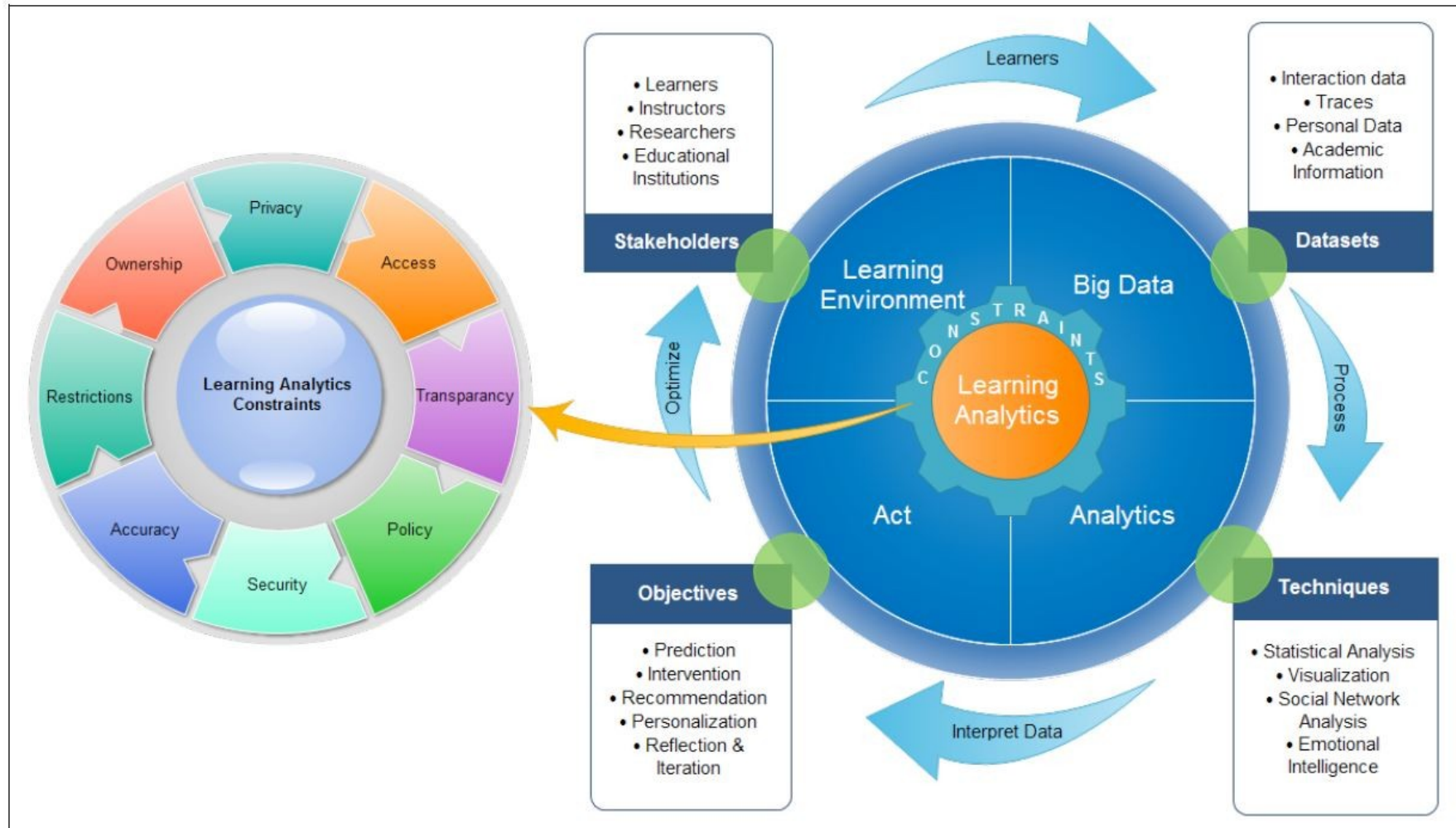
Why Learning Analytics?

Enterprise context (enterprise social networks)

- Measuring achievement of objectives to establish success-oriented reporting → proving justification of existence
- Feedback is based on quantified results and not only on personal assessment
- Monitoring the activity of employees on the enterprise social network to increase effectiveness and efficiency
- Creating incentive systems inside the community of the enterprise social network, e.g. gamification



2 Usage of Learning Analytics



2 Usage of Learning Analytics

Elements of Learning Analytics

Methods

- Analysis
- Data visualization tools and techniques
- In addition EDM methods are used:
 - Predication
 - Clustering
 - Relationship mining
- Data-intensive approach vs. Scientific Method



2 Usage of Learning Analytics

Benefits of Learning Analytics

Institutional:

- Identifying target courses
- Curriculum improvement

Instructor/students:

- Student learning outcome behavior and process
- Personalized learning
- Improved instructor performance

VCL:

- Feedback for instructors by indicators



2 Usage of Learning Analytics

Challenges of Learning Analytics

- Data Tracking
- Data collection
- Evaluation process
- Data Analysis
- Connecting to Learning sciences
- Ethical and privacy issues



3 Gamification Basics

Why Gamification?

One of the biggest challenges of e-learning courses is to find a way to keep the participant's motivation constant.

- Studies show that in average only 15% of participants complete a course



3 Gamification Basics

Definition & Differentiation

Gamification is:

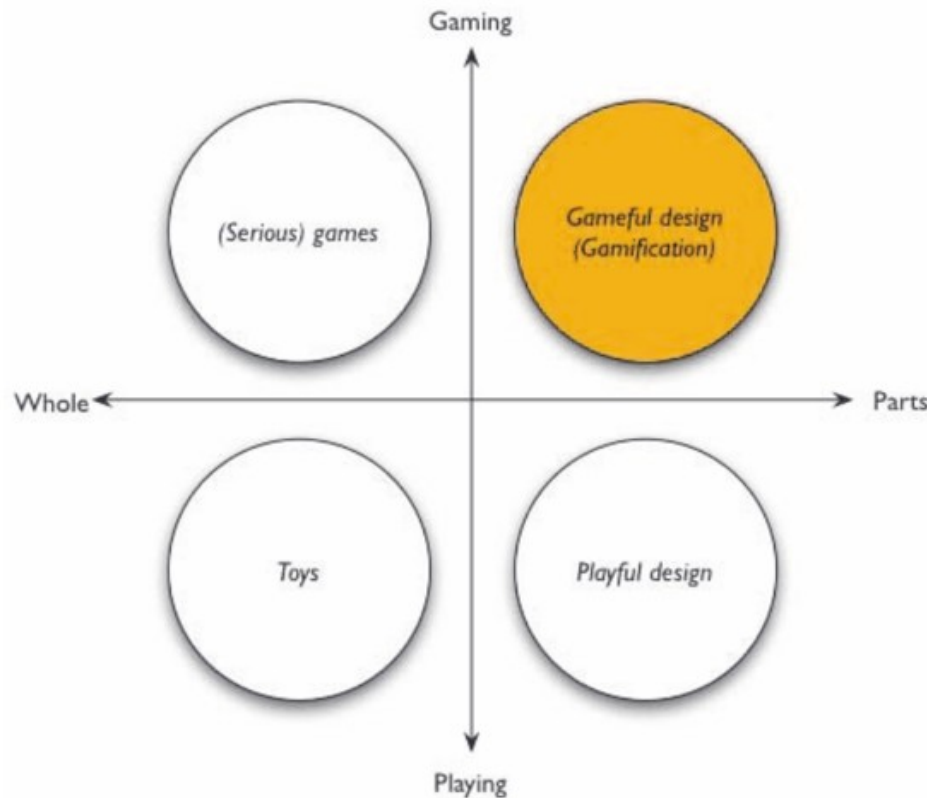
"The introduction of game elements into existing processes or objects which are not playful per se" (Grünberg, 2014)

Gamification is not,

- To reflect the normal working environment virtual (Deißler, 2013)
- Every game at work (Deißler, 2013)
- All games with company context (Deißler, 2013)
- The use of independent learning games in e-learning (Raymer, 2011)



3 Gamification Basics



Deterding et al. 2011

Characteristics

- Game design elements
- Games in "none game contexts"
- Design strategy
- Human-centered
- Motivation
- Participation and involvement
- Emotions

Strategy for the learner-centred and motivation-enhancing design of learning situations and learning environments through the use of game elements.

3 Gamification Basics

Basic principles

Meaning



<http://www.spiegel.de/fotostrecke/winter-game-50-000-eishockey-fans-im-fussballstadion-fotostrecke-91619-6.html>

3 Gamification Basics

Basic principles

Meaning



http://ergonomicsindesign.com/wp-content/uploads/65440175_2bb0551a5d_z.jpg
<https://i.pinimg.com/originals/ba/90/8d/ba908dbd2ba6b7bcd85fc3cde15af568.jpg>
http://cdn-9chat-fun.9cache.com/media/photo/a5obEeNrm_480w_v1.jpg

3 Gamification Basics

Basic principles

Mastery



<https://cdn.images.express.co.uk/img/dynamic/36/590x/secondary/darth-vader-force-choke-1086313.jpg>

3 Gamification Basics

Basic principles

Autonomy



http://bilder.zuhause.de/b/68/23/39/72/id_68233972/tid_da/tipps-fuer-den-sandkasten-aus-holz-.jpg

4 Designing Gamification

Player types after Marczewski:

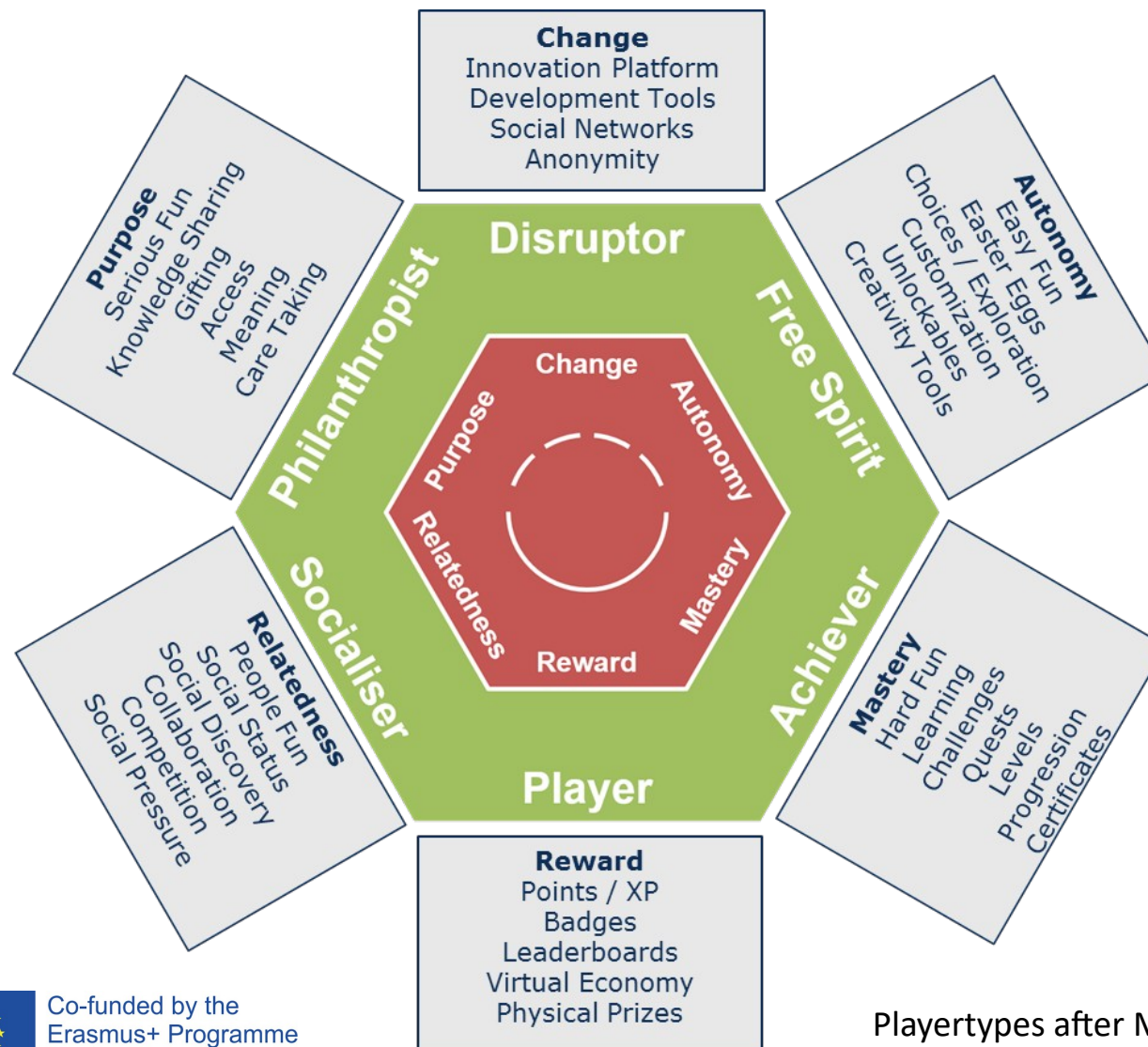
- Philanthropists act unselfish and seek for meaning.
- Socialisers are motivated by social relationships.
- Players are motivated by extrinsic rewards.
- Achievers want to expand their knowledge and are looking for challenges.
- Free Spirit want to be creative and discover new things.
- Disruptors are people who disrupt the system on purpose.



© Andrzej Marczewski 2016



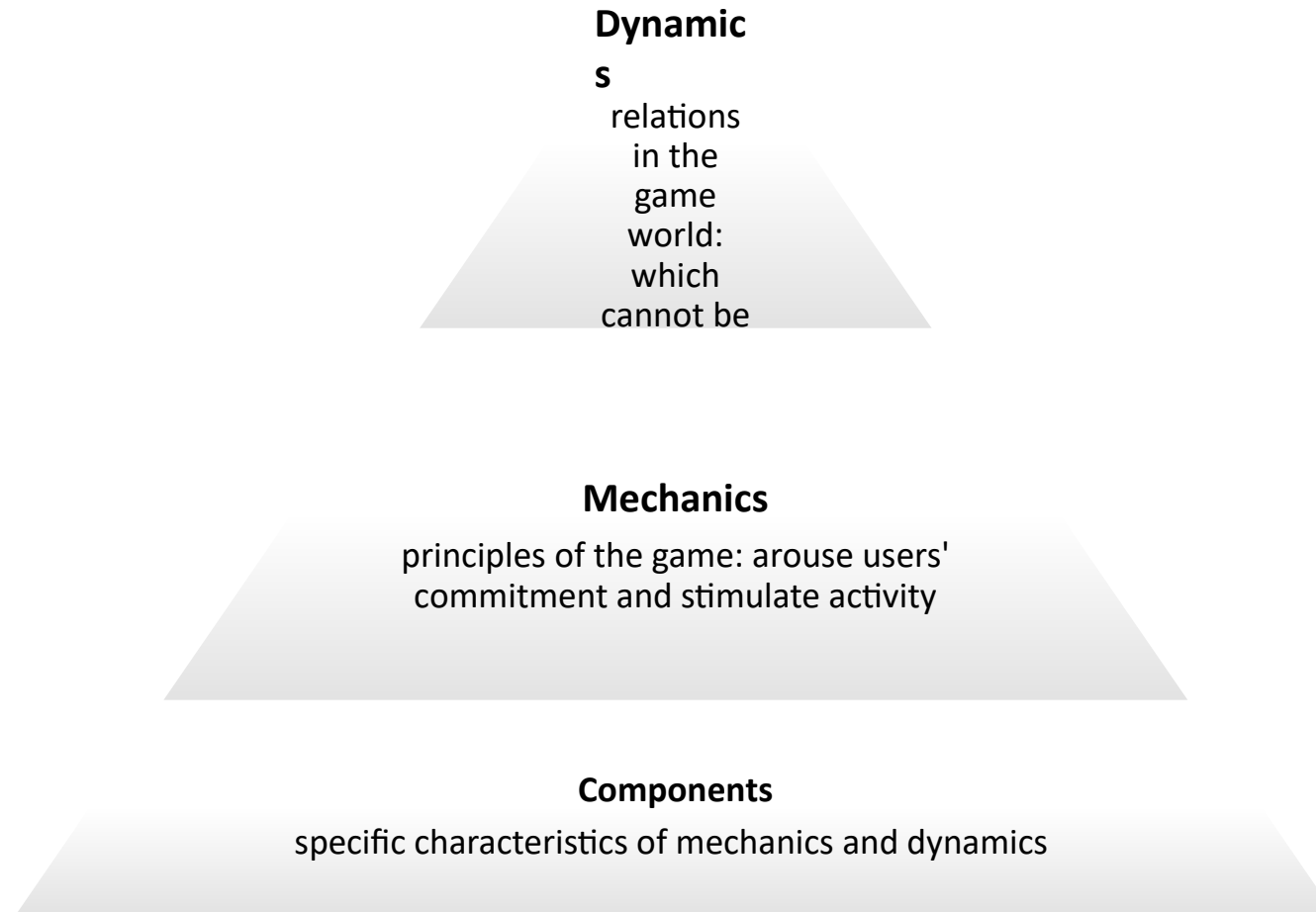
4 Designing Gamification



Playertypes after Marczewski (2015)

5 Gamification Elements

Game elements



5 Gamification Elements

Periodic Table of Gamification Elements


Gamified UK

1 Rr Random Rewards											2 Fr Fixed Reward	3 Td Time Dependent	
4 Ob On-boarding	5 Si Signposting	6 La Loss Aversion	7 I Investment					8 Pf Progress / Feedback	9 T Theme	10 N Narrative	11 C Curiosity		
12 Tp Time Pressure	13 S Scarcity	14 St Strategy	15 F Flow	16 Co Consequences	17 Gt Guilds / Teams	18 Sn Social Network	19 Ss Social Status	20 Sd Social Discovery	21 Sp Social Pressure	22 Cm Competition			
23 Ch Challenges	24 Ce Certificates	25 L Learning	26 Q Quests	27 Lp Levels / Progression	28 Bb Boss Battles	29 E Exploration	30 Bc Branching Choices	31 Ee Easter Eggs	32 U Unlockables	33 Ct Creativity Tools			
34 Cu Customisation	35 Ap Altruistic Purpose	36 Cg Care Taking	37 A Access	38 Cn Collection	39 Gs Gifting / Sharing	40 Ks Knowledge Share	41 P Points	42 Pr Prizes	43 Le Leaderboards	44 B Badges			
		45 Ve Virtual Economy	46 Lo Lottery	47 Ip Innovation Platform	48 V Voting	49 Dt Development Tools	50 A Anonymity	51 Lt Light Touch	52 An Anarchy				

Reward Schedule

General

Socialiser

Achiever

Free Spirit

Philanthropist

Player

Disruptor

<https://www.gamified.uk/wp-content/uploads/2017/04/Periodic-Table-of-Gamification-Elements-1024x724.png>

5 Gamification Elements

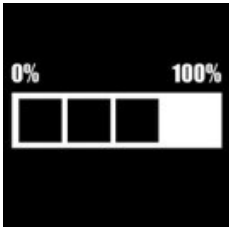
Selected Gamification Elements <https://www.gamified.uk/user-types/gamification-mechanics-elements/>

General



On-boarding / Tutorials

No one uses manuals anymore! Help people get used to your system with a nice tutorial or a gentle introduction on how everything works.



Progress / Feedback

Progress and feedback come in many forms and have many mechanics available. All User Types need some sort of measure of progress or feedback, but some types work better than others.



Time Pressure

Reducing the amount of time people have to do things can focus them on the problem. It can also lead to different decisions.

5 Gamification Elements

Selected Gamification Elements <https://www.gamified.uk/user-types/gamification-mechanics-elements/>

Schedules



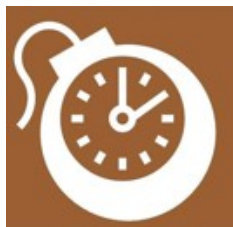
Random Rewards

Surprise and delight people with unexpected rewards. Keep them on their toes and maybe even make them smile.



Fixed Reward Schedule

Reward people based on defined actions and events. First activity, level up, progression. Useful during on-boarding and to celebrate milestone events.



Time Dependent Rewards

Events that happen at specific times (birthdays etc.) or are only available for set period of time (e.g. come back each day for a reward). Users have to be there to benefit.

5 Gamification Elements

Selected Gamification Elements <https://www.gamified.uk/user-types/gamification-mechanics-elements/>

Socialiser



Social Status

Status can lead to greater visibility for people, creating opportunities to create new relationships. It can also feel good. You can make use of feedback mechanics such as leader boards and certificates.



Social Status

Status can lead to greater visibility for people, creating opportunities to create new relationships. It can also feel good. You can make use of feedback mechanics such as leader boards and certificates.



Competition

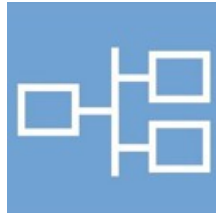
Competition gives people a chance to prove themselves against others. It can be a way to win rewards, but can also be a place where new friendships and relationships are born.



5 Gamification Elements

Selected Gamification Elements <https://www.gamified.uk/user-types/gamification-mechanics-elements/>

Free Spirit



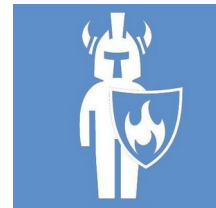
Branching Choices

Let the user choose their path and destiny. From multiple learning paths to responsive narratives. Remember, choice has to be or at least feel meaningful to be most effective and appreciated.



Creativity Tools

Allow people to create their own content and express themselves. This may be for personal gain, for pleasure or to help other people (teaching materials, levels, gear, FAQ etc).



Customisation

Give people the tools to customise their experience. From avatars to the environment, let them express themselves and choose how they will present themselves to others.



5 Gamification Elements

Selected Gamification Elements <https://www.gamified.uk/user-types/gamification-mechanics-elements/>

Achiever



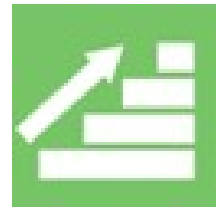
Challenges

Challenges help keep people interested, testing their knowledge and allowing them to apply it. Overcoming challenges will make people feel they have earned their achievement.



Certificates

Different from general rewards and trophies, certificates are a physical symbol of mastery and achievement. They carry meaning, status and are useful.



Levels / Progression

Levels and goals help to map a users progression through a system. It can be as important to see where you can go next as it is to see where you have been.



5 Gamification Elements

Selected Gamification Elements <https://www.gamified.uk/user-types/gamification-mechanics-elements/>

Philanthropists



Meaning / Purpose

Some just need to understand the meaning or the purpose of what they are doing (epic or otherwise). For others they need to feel they are part of something greater than themselves.



Care-taking

Looking after other people can be very fulfilling. Create roles for administrators, moderators, curators etc. Allow users to take a parental role.



Sharing Knowledge

For some, helping other people by sharing knowledge with them is its own reward. Build the in the ability for people to answer questions and teach others.

5 Gamification Elements

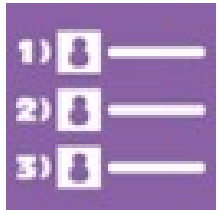
Selected Gamification Elements <https://www.gamified.uk/user-types/gamification-mechanics-elements/>

Player



Points / Experience Points (XP)

Points and XP are feedback mechanics. Can track progress, as well as be used as a way to unlock new things. Award based on achievement or desired behaviour.



Leaderboards / Ladders

Leaderboards come in different flavours, most commonly relative or absolute. Commonly used to show people how they compare to others and so others can see them. Not for everyone!

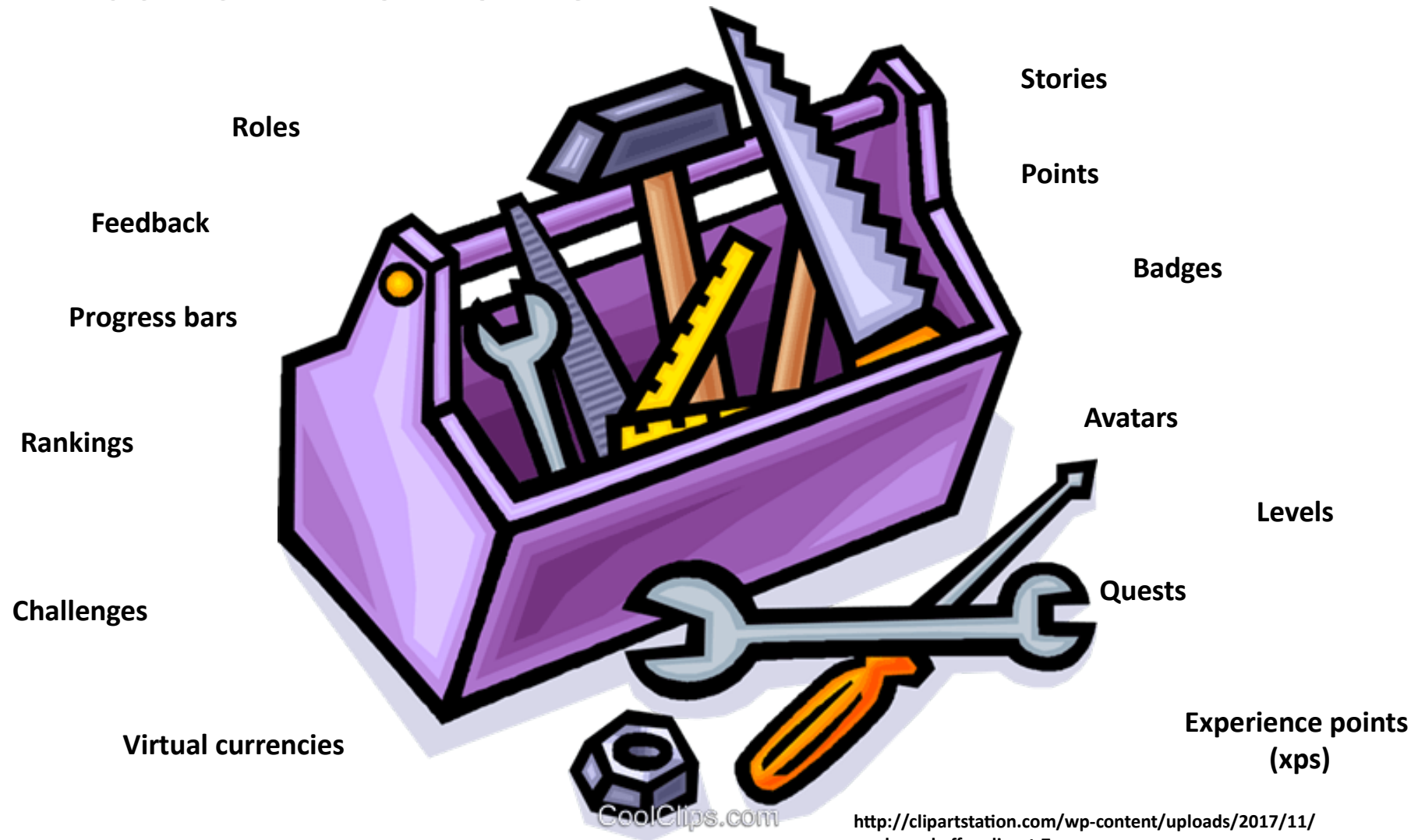


Badges / Achievements

Badges and achievements are a form of feedback. Award them to people for accomplishments. Use them wisely and in a meaningful way to make them more appreciated.



5 Gamification Elements



6 Conclusion

To Gamify or not to Gamify? The Dark Side of Gamification (Tracey 2015)

1. Life is not a game.
2. Games can trivialise serious issues.
3. Games may reinforce the wrong mindset.
4. Games can contaminate motivation.
5. Games will be gamed.



There's a fine line between an engaging learning experience and an insidious waste of time.

Take a moment to consider the unintended consequences.

6 Conclusion

Successful Gamification (Business Systems UK, n.d.)

- What is the reason for gamifying your module or platform?
- How does it benefit the students?
- Will they enjoy it?

You need to recognise if your users are motivated by:

- Achievement of goals or enjoyment of experience
- Structure and guidance or freedom to explore
- Control of others or connecting with others
- Self-interest in actions or social interest in actions

Most importantly, do not implement gamification if you are not willing to provide valuable feedback and reward positive behaviours.

Acknowledging and rewarding good performance, whatever that might be, is the most important aspect of gamification and needs to be taken seriously and prioritised.



Sources

- Bienkowski, M., Feng, M., & Means, B. (2012). *Enhancing teaching and learning through educational data mining and learning analytics: An issue brief*. U.S. Department of Education, Office of Educational Technology. Washington, D.C. Retrieved from <http://www.ed.gov/technology>.
- Buckingham Shum, S., & Ferguson, R. (2012). Social learning analytics. *Educational Technology & Society*, 15(3), 3-26.
- Business Systems (UK). (n.d.). Gamification Part 1 - To Gamify or not to Gamify.
- Chatti, M. A. (2013). The laan theory. Personalization in technology enhanced learning: A social software perspective, 19-42.
- Chatti, M. A., Dyckhoff, A. L., Schroeder, U., & Thüs, H. (2012). Forschungsfeld Learning Analytics. *i-com*, 11(1), 22-25.
- Clow, D. (2012, April). The learning analytics cycle: closing the loop effectively. In *Proceedings of the 2nd international conference on learning analytics and knowledge* (pp. 134-138). ACM.
- Deißler, N. (2013). Abgrenzung: Was nicht unter Gamification fällt. Abgerufen 20. Januar 2018, von <http://digitalfit.de/abgrenzung-gamification/> Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011, September). From game design elements to gamefulness: defining "gamification". In *Proceedings of the 15th international academic MindTrek conference: Envisioning future media environments* (pp. 9-15).
- Dyckhoff, A. L. (2014). Action research and learning analytics in higher education. *eleed*, 10(1).
- EDUCAUSE. (2010). Next generation learning challenges: Learner analytics premises. *EDUCAUSE Publications*. Retrieved from <http://www.educause.edu/Resources/NextGenerationLearningChalleng/215028>
- Ferguson, R., & Shum, S. B. (2012). Social learning analytics: Five approaches. *Proceedings of the 2nd International Conference on Learning Analytics and Knowledge* (LAK '12), 29 April–2 May 2012, Vancouver, BC, Canada (pp. 23–33). New York: ACM.
- Grandl, M., Taraghi, B., Ebner, M., Leitner, P., & Ebner, M. (2017). Learning Analytics. *Handbuch E-Learning: Expertenwissen aus Wissenschaft und Praxis-Strategien*, 1-16.
- Grünberger, N. (2014). *Gewinnt der Mensch nur da, wo er spielt? Ein Essay über Gamification zur Bewältigung von Anforderungen der Arbeitswelt*. Magazin *Erwachsenenbildung*. at, (22).
- Hart, J. (2013). 5 characteristics of how Knowledge Workers like to learn at work. Retrieved September 10, 2016, from <http://www.c4lpt.co.uk/blog/2013/04/25/5-characteristics/>
- Johnson, L., Smith, R., Willis, H., Levine, A., & Haywood, K., (2011). *The horizon report: 2011 edition* (Report). Retrieved from <https://net.educause.edu/ir/library/pdf/HR2011.pdf>
- Nunn, S., Avella, J., Kanai, T., & Kebritchi, M. (2016). Learning Analytics Methods, Benefits, and Challenges in Higher Education: A Systematic Literature Review. *Online Learning*, 20(2). doi:<http://dx.doi.org/10.24059/olj.v20i2.790>

Sources

- Lias, T. E., & Elias, T. (2011). *Learning analytics: The definitions, the processes, and the potential* (Report). Retrieved from <http://learninganalytics.net/LearningAnalyticsDefinitionsProcessesPotential.pdf>
- Marczewski, A. C. (2015). *Even Ninja Monkeys Like to Play: Gamification, Game Thinking and Motivational Design*. CreateSpace Independent Publishing Platform.
- Otto, D. (2018). *The challenge of virtual mobility: pedagogical models and good practices*. In *International Technology, Education and Development Conference* (pp. 3368–3376). ESP.
- Pardo, A., & Siemens, G. (2014). Ethical and privacy principles for learning analytics. *British Journal of Educational Technology*, 45(3), 438-450. doi:10.1111/bjet.12152
- Raymer, R. (2011). *Gamification: using game mechanics to enhance eLearning*. *eLearn*, 2011(9), 3. Reinmann-Rothmeier, G. & Mandl, H. (2002). *Analyse und Förderung kooperativen Lernens in netzbasierten Umgebungen*. *Zeitschrift für Entwicklungspsychologie und Pädagogische Psychologie*, 31 (1), 44-47.
- Scheffel, M., Drachsler, H., Stoyanov S., & Specht, M. (2014). Quality indicators for learning analytics. *Educational Technology & Society*, 17(4), 117–132.
- Siemens, G., & Baker, R. (2012, April). Learning analytics and educational data mining: Towards communication and collaboration. *Proceedings of the 2nd International Conference on Learning Analytics and Knowledge* (LAK '12), 29 April–2 May 2012, Vancouver, BC, Canada (pp. 252–254). New York: ACM.
- Tracey, R. (2015). *The dark side of gamification*.
- Werbach, K., & Hunter, D. (2012). *For the win: How game thinking can revolutionize your business*. Wharton Digital Press.





Virtual Albanian European
Universities eXchange

Thanks a lot for your attention.

More information about the project: www.valeu-x.eu

More information about the Chair of Information Mangement:
https://tu-dresden.de/bu/wirtschaft/winf/wiim?set_language=en

www.valeu-x.eu



Co-funded by the
Erasmus+ Programme
of the European Union



TECHNISCHE
UNIVERSITÄT
DRESDEN



Mednarodna fakulteta
za družbene in poslovne študije
International School
for Social and Business Studies
Celje · Slovenia · Europe



Universiteti
European i
Tiranës



EPOKA
UNIVERSITY

