



GATE:VET

# LET THEM PLAY

## A Journey to Game-Based Learning




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

We would like to thank all those who contributed to the production of this handbook as well as Erasmus+, who made the project and all its outputs possible.

LET THEM

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# FOREWORD

## DEAR READER,

Welcome to our handbook *Let Them Play*. By "them" we mean you as teachers (particularly in Vocational Education and Training - VET) when designing GBL; and we mean your students, whose learning motivation and success can be positively influenced when you gamify your classroom. Playing games is also believed to improve social skills, solidarity and collaboration between your students.
We - the GATE:VET project team - have created this resource to share all the insights and outcomes we have gained from the Erasmus+ funded project GATE:VET. A varied selection of contributions brings together international perspectives, experiences and knowledge from practitioners and researchers in the field of Game-Based Learning (GBL).

We invite you to discover more about the theoretical aspects of GBL and to take inspiration from various accounts of **GBL in Practice.** This booklet offers an abundance of food for thought and links to practical resources and materials, which you can use in your teaching.

**Before you can start exploring, we would like to give you some hints and suggestions on how to make the most of this resource:**

The texts do *not* follow a particular order and you are welcome to browse the contents. Throughout the book we have also included details of our project GATE:VET and its outcomes. Short biographies of all authors can be found at the end of the handbook.

**...find out more about this in the GATE:VET wiki.**

***[01]*** **...this source can be found on the list of references at the end of the book.**

**...the author is located there.**

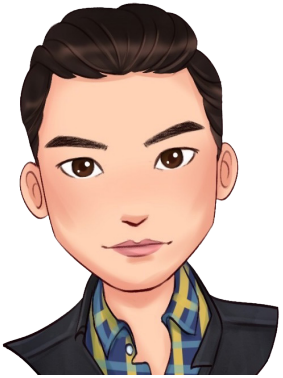
**...find out more about this topic or person.**

# Hybridity, Playfulness, and Game-Based Pedagogy

*Sylvester Arnab*

**Hybridity at the Speed of Need**

Technology and new ways of working change and advance at a rapid pace, making it challenging for educational systems to keep up and continue to update at a similar pace. The pandemic further presents a great challenge to teaching and learning globally. The immediate response has been the mobilisation of digital online learning to ensure remote education access at home. The sudden transition to technology-delivered instruction has been disconcerting for educators and learners alike. As the world starts to open up, it is essential for us to reflect on the experience of configuring and reconfiguring teaching and learning experiences across the various modalities. Were they at the speed of need? One of the main challenges posed by this sudden change is whether meaningful learning experiences can still be facilitated on online platforms. Putting learners at the heart of the agenda, it is essential to ensure that their learning experiences are configured and reconfigured as and when it is needed for supporting their growth in their learning process, aligning with the 'hybrid learning' perspective. "With the perspectives of learning at the speed of need across different spatial, contextual, and material modalities, and the blending of these modalities, hybrid learning proposes a more pragmatic and holistic approach for finding the right combination out of all modalities, whether they are offline or online, digital or analogue, passive or experiential, formal or informal" [01].



When education blends seamlessly into our daily lives and vice versa, the world becomes our biggest playground for exploration, experimentation and meaning making. As pedagogical paradigms are continuously evolving, in response to the shift in socio-cultural, economic, and technological landscapes, learners are expected to be more self-

regulated, agentic, and empathic in the way they author and navigate their learning experiences. As experiential learning is brought to the forefront, educators are now creators, agents, and facilitators of change, nudging and nurturing attitude, aptitude, and behaviour that will prepare learners for the realities of tomorrow's world.

The Fourth Industrial Revolution will of course expect competencies and capabilities in emerging technologies. However, technologies will be ever-changing and evolving, thus requiring a more holistic and human-centred approach for learners to develop inter- and transdisciplinary skills towards becoming active lifelong learners. Learners will need to adapt, innovate and be responsive to the changing world and contribute to innovative economies and resilient societies.

Educators thus play a critical role in embedding these perspectives in their pedagogical practices as they are the direct means for addressing the targets of equitable and inclusive quality education. Educators should be empowered to redesign and reimagine their practices, inspired by new pedagogical approaches. The educational landscape will continue to change and evolve as pedagogy is shifting from traditional didactics to more hands-on activities and from more hands-on activities to highly connected experiences [02].

## Experiential Learning through Play and Gameplay

Education is becoming more experiential, shifting away from the passive and conventional teaching that emphasises on information transmission and memory. Learners should be engaged with new and creative ways of being and doing, providing them with opportunities to safely envision themselves in roles and situations that will help them to contextualise their learning and aspirations. Learning-by-doing includes reflection and collaboration[03], favouring active dialogue, inquiry-based, creative, and learner-centred approaches that can be facilitated via playful and gameful pedagogy.

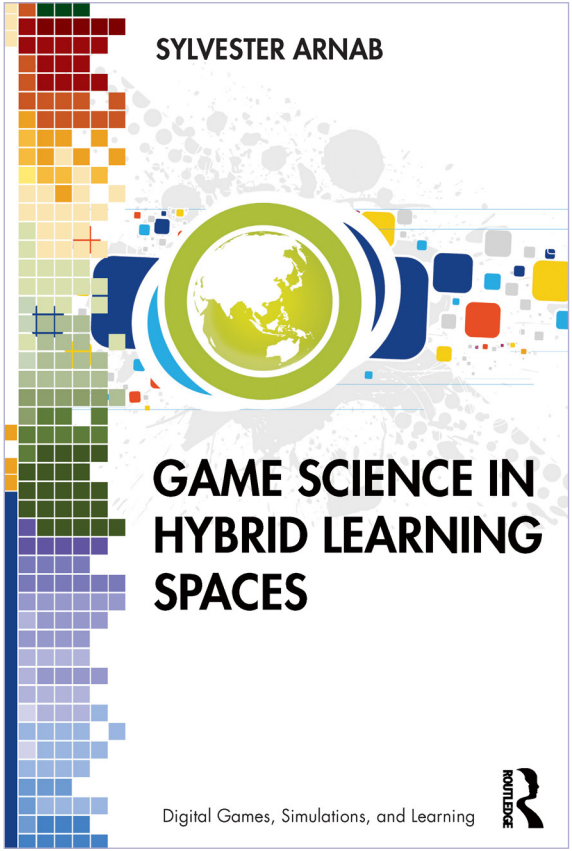
Play and gameplay promote the autonomy and agency for learners to engage with, develop curiosity about, and learn from the world and people around them in positive ways[04]. The use of playful and gameful pedagogical practices provides such experiential means for a learning process to be facilitated, attitudes and behaviours to be nurtured, and relevant

competences and capabilities to be acquired. The experiential aspects can be achieved through constructed/simulated or realistic game and game-like environments across the spatial, temporal, and social modalities, enabling learners to experience various scenarios, apply their knowledge and skills, and reflect on their learning.

Gaming is a culturally accepted activity worldwide with a growing relevance in education because games broaden and extend what traditional teaching methods could facilitate. As gaming technology evolves, the danger is that people will get very excited and highly driven by new opportunities to leverage their didactics and content onto the next trendy development. There is nothing wrong with this at all. However, there is a need for a hybrid approach for focusing on what experience would best benefit the learners as well as the educators. Games and gameplay provide insights into the mechanics, dynamics and aesthetics of engagement and participation in experiences that encourage learners to act, make decision and reflect, nurturing a life-long learning practice that will guide them in future inquiries.

Learners should also be offered the options to not just passively consume and experience but to also create contents and experiences. The use of games and gameplay in education also extends to the use of the game design and making process as an educational practice. Designing and creating games and game-like systems, as an activity on the edge of the diverse disciplines, is a fertile ground to cultivate creative and innovative mind-sets, providing space for learners to learn how to fruitfully cooperate. Game-making as an empathic and agentic learning process can foster competencies such as (co)creativity, problem-solving, and social-emotional skills. When creating games for addressing serious issues or topics, learners will be able to apply knowledge and skills creatively in problem solving and develop team working and communication skills.

Learners who experience autonomy and agency in learning are fully engaged and immersed in an educational process. Autonomy and agency are key attributes of playfulness that is a characteristic of hybridity in open education for broadening access to education for those wanting to learn. Games, whether they are analogue, digital, or pervasive




enable play and, intended and incidental learning through gameplay. Games are valuable means through which play can be observed and facilitated in a more objective way, which can lead to purposeful and meaningful engagement, and actionable feedback and reflection.

**Hybridity in Play and Game-Based Pedagogy**

Hybrid learning is not techno-deterministic but is dependent on the intended experiences and their contexts, which are central to the choice of instruments that enable these experiences to happen. Hybridity within the context of learning through playful and gameful approaches fundamentally proposes a rethink of our conception and contextualisation of learning spaces, contexts, and materials, and how learners' engagement is sustained within the learning process. Learners are encouraged to test, apply, iterate, and increment their knowledge and skills in a safe environment, where "failures" are seen as opportunities for developing resilience and persistence. Learners can reflect on their experiences, arrive at new conclusions, and think about how they would apply these conclusions in civic participation and the world of work.

When using playful and gameful resources, the

configuration of the learning experience must consider a complete programme of 'intervention'. For instance, game-based pedagogy as an educational intervention should include self and group reflections, which enrich and deepen the learning experience. Educators can facilitate reflective dialogues and group discussion/de-briefing to enhance clarity and enrich the playful learning experience for building understanding without direct instruction or interference, promoting the learners' sense of autonomy and agency. Knowledge and skills are constructed, and a creative inquiry process is facilitated through social constructivism[05]. Constructivism suggests that individuals learn through active exploration and that learning occurs within a social context between learners and their peers.

**Are We Game for Tomorrow's World?**

By traversing learning scenarios scaffolded through play and game-based activities, learners benefit from the transferability of the metacognition process into practices in their day to day lives, including their formal education, informal learning, and social interactions. A metacognition process is "...a reflective process, where learners constantly monitor and evaluate their progress during problem solving. Learners can reflect on whether their current level of understanding is sufficient, often occurs in formal and informal settings throughout their lifetime"[01], nurturing intrinsic motivation in the learning process. Such motivation to solve problems often links to the concept of "hard fun"[06], where engaging with optimal challenges towards experiencing mastery leads to positive engagement in problem solving activities. The need

for competence often leads learners and players alike to "seek challenges that are optimal for their capacities and to persistently attempt to maintain and enhance those skills and capacities through activity" [07].

The spaces, contexts, and materials to facilitate such learning should be configured at the speed of need, which requires a more empathic approach in understanding and responding to the needs of the learners as both educators and learners navigate through the learning journey. The hybrid learning perspective is key here for providing permission to experiment, explore, reflect, and iterate the direction of learning, mirroring the agentic characteristics of play and gameplay.

Hybrid learning concerns connected experiences that contextualise education that is not defined, driven nor restricted by specific technologies and/or pedagogies. It is a practice that is established in a more holistic, empathic, and inclusive manner. The localised needs of the learners and the situational relevance of the approach should be considered to allow learners to have the autonomy and agency in discovering meaningful relationships between abstract ideas, practical applications, and the value of knowledge in the context of the real world. Concepts are internalised via the process of discovering, reinforcing, and relating.

The hybrid perspective argues that playful and gameful approaches enable, facilitate, and afford experiential, creative, and exploratory environments for engaging learners as well as educators with the application of real-world contexts into the teaching and learning process. Learners engage in hands-on enquiry, creative designs, and open-ended exploration. Using play and gameplay as the mechanics of learning can promote the transition from knowledge acquisition to participation as well as the recognition and discovery of values in the learning experience, which can be social, cultural, economic, environmental, and so forth.

The configuration of learning experiences can align with the key aspects of 21st Century learning, i.e., 'to know' (foundational knowledge), 'to act' (meta knowledge) and 'to value' (humanistic knowledge). Not only is education essential for developing knowledge and skills, but it is also important for nurturing attitudes and values that will enable learners to contribute to and benefit from an inclusive and sustainable future.

# GATE:VET Project - using GAmification in TEaching at VET schools

The main aim of the Erasmus+ project GATE:VET is to expand the methodological repertoire of teachers at vocational schools by giving them the opportunity to enrich their classes with educational games and raise awareness for GBL. The gamification of teaching content and the underlying concepts can improve the learning success of students. Enhancing the learning experience stimulates positive emotions that have a beneficial effect on the learning process.

For this purpose, two platforms (wiki and app) were developed to provide a variety of training materials for creating gamified teaching settings. These platforms can further be used to explore the theoretical background of GBL-related concepts and terms.

The project also developed a curriculum for training teachers. It shows them how to use the resources and platforms provided and then act as multipliers in their respective institutions. In addition, there was a training-of-trainers activity involving teachers from the schools participating in the project.

**GBL can...**
*be a stimulating and activating addition to VET lessons, as it can specifically target transversal professional competences (such as teamwork).*

**GBL cannot...**
*substitute a pedagogically designed lesson, as it needs to be adapted to the learners, the purpose and the environment within which it is used.*

As part of the project, an international conference was hosted by project coordinators AFBB in June 2021: the *European Gamification in Education Conference*. The virtual event took place in gather.town and provided a space for exchange for educators and researchers interested in all things GBL. Some of the presenters also contributed entries to this handbook sharing their knowledge, perspectives and experiences with the theory and/or practice of GBL.

This handbook was then developed for publication in print and digital form to connect and further profile the main findings of the project.

MORE INFO HERE

# AFBB

The Academy for Vocational Training (AFBB) operates several vocational schools in Dresden, Berlin and Cologne (Germany).
The various training courses are characterised by high quality as well as practical relevance and lead to recognised qualifications. AFBB has extensive experience in the implementation of EU-funded projects as lead and project partner and, together with national and international partners, has successfully collected expertise in the creation of concepts for modernising teaching. In that context, the use and integration of digital technologies and digital methods play a crucial role, not only for the general digitization strategy of the school, but also for the integration of results and experience from projects in that sector.

Madeleine Diab

Bettina North

Named the United Kingdom's Modern University of the Year by the *Times* and *Sunday Times* (2014, 2015 and 2016), Coventry University has a reputation for excellent teaching and research, business engagement, innovation and entrepreneurship. It has an extensive track record in engagement with Europe and European research and development and widely recognised experience in the delivery of Framework Programme activity (FP6, FP7, Horizon 2020) with European collaborative management experience from lead and partner roles on Leonardo, Erasmus, INTAS, DAPHNE, Socrates, INFO 2000, MLIS, Promise, Erasmus+ and EuropeAid projects.

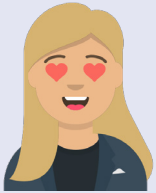
COVUNI has a substantial experience in game-based learning and teaching with focus on design and the development of serious games, mapping learning mechanics to game mechanics and enacting associated pedagogical approaches to create a balance between entertainment and learning in game aspects. Complementary expertise such as game assets development, and games evaluation using in-game analytics as well as qualitative and quantitative evaluation methodologies are essential elements of our repertoire to measure the impact of the game-based intervention. COVUNI designs, develops and evaluates games for enhancing teachers' teaching and amplifying student learning, digital competencies and social inclusion in pedagogically meaningful ways.

Petros Lameras

FHD Fachhochschule Dresden

Maik Arnold

Helge Fischer



Josefin Müller

Established in 2010, Dresden University of Applied Sciences (FHD) is a private, state-approved German university. Currently, there are more than 500 students studying in fourteen accredited Bachelor degree programs (full time and extra-occupational degrees) in the areas of Business, Logistics, Tourism, Graphic and Media Design, Digital Education, Health and Social Pedagogy.

FHD focuses its research strategy both on societal challenges and on mid-sized structures as a driving force behind a positive social development. FHD's research and transfer projects contribute greatly to the management of structural change in the world of employment and focus particularly on the mid-sized sector and the life-long development of individual knowledge and competencies.

Pioneer in digital training for the last 10 years, Manzalab combines neurosciences, gamification and new technologies to design and develop immersive and impactful experiences. Thanks to a multidisciplinary team, combining skills from video games, software engineering, design management and UX/UI, the company based in Paris and Aix en Provence has been able to deliver more than 200 projects to clients and partners, including 17 Research & Development projects focusing on training and remote collaboration in virtual environments.

Stéphanie Philippe

Valérie Radelet

Jazmin Zaraik

Maria Storm-Holm

# VUC STORSTRØM

VUC Storstrøm is an Adult Education Centre and a self-governing institution under the Ministry of Education. VUC Storstrøm offers general adult education, higher preparatory examination, preparatory adult education (basic skills) and several special programs for learners with special needs, as well as custom-tailored courses for companies. VUC Storstrøm is a hybrid school with modern learning technology and covers the largest geographical area in Denmark in the Adult Education Sector. Via education, we wish to strengthen young people and adults' active involvement in society and their opportunities to improve their own lives. We give weight to development and international cooperation, offering educational and professional competences of a high standard.

VUC Storstrøm is experienced in the role as both partner and lead partner in international projects, such as EC programmes, Danish network projects, regional development projects, and development and implementation of *Global Classroom*, our USDLA award winning learning concept. Through these projects and activities, VUC Storstrøm has experience within digital facilitation of teaching, meetings and seminars.

As part of the development strategy at VUC Storstrøm we are working with games in education on several levels, from basic skills training to higher preparatory or high school level. We have developed our own gamified learning management system, *Global Academy*, which we use in both a traditional school setting, but also in a company training environment.

Nicu Gane National College from Fălticeni (Romania) is a general secondary school founded in 1870. At present there are about 1200 students studying in the following areas: Informatics (VET part of the school – about 600 students), Natural Sciences, Modern Languages and Social Sciences. CNNG is an ECDL accredited high school for Fălticeni students and has a CISCO local academy. A strategic goal of the Institutional Development Plan is preparing the graduates for the requirements of the information society, especially the use of new technologies.

CNNG has been involved in several Erasmus+ projects (mobility projects and strategic partnership projects).

Ioan Caulea

Florin Ilincăi

# Recent Findings and Future Developments in GBL Research

*Steve Nebel*

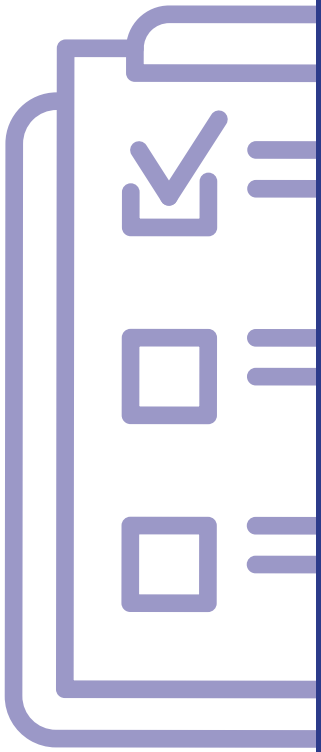
**Research should be gradually applied to other game mechanics and instructional principles. It is important to establish the respective conditions for success, potential and limitations.**

The central element of our research[08] is the assumption that the application of GBL or gamification features must be considered from at least two perspectives. On the one hand, it is important to use thoroughly validated and empirically substantiated pedagogical principles or methods of teaching and learning with digital media. In the study presented, these were, for example, the *Jigsaw Principle*[09] and the *Collective Working Memory Effect*[10] [11].

On the other hand, these approaches must also find suitable equivalents in game design. Not only is social interaction a popular game mechanic[12], but also the Jigsaw approach (in the sense of distributed information and skills) is very popular in many games. It is important to look for similar approaches in the practice and to implement these where possible.

The number of high-quality studies on the topic of GBL is continuously increasing. Meta-analytical studies, which classify the effects found, already show promising indications of the criteria to be to be considered when using GBL. These insights are ideally gained in randomized and broad samples in order to

generate findings that are as generalisable as possible. In the future, other questions will emerge though: What is the best way to learn with GBL, not only in principle but also on a case-by-case basis? Which design features are generally useful and which mechanics are suited for highly individual preferences and characteristics? Are there any conditions under which the effect is reversed from the proven effect (e.g. an aversion to certain mechanisms, lack of media competence)? Further, what role do socio-cultural conditions play? Educational or instructional psychology is increasingly addressing how digital learning materials can be adapted to the individual[13] [14]. Consequently, the insights gained must also be applied in the field of GBL research. This is an approach that is not yet being pursued vigorously enough[15]. At the same time, video games already have a long history of customisation. Not only user-driven (e.g. customisable graphical user interfaces), but also from a media perspective (e.g. adaptive difficulty levels) numerous examples can be identified. Combining this expertise with the knowledge of psychology could significantly develop GBL. Issues such as accessibility, inclusion and educational equity should be considered so that this development benefits all learners. Ultimately, in the course of the process described, adaptivity could establish itself as a further key advantage of this approach. To this end, teachers should pay attention to individual user characteristics and articulate the need for appropriate learning media.



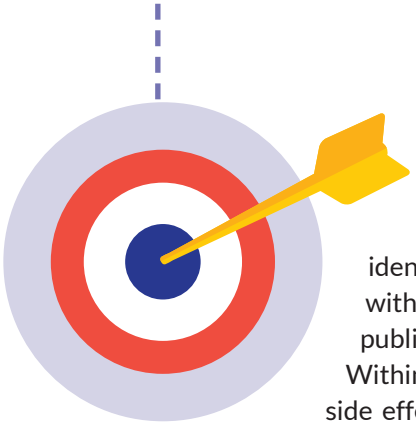
# Gamification's Dark Side Horizon

*Matthias Heinz*

**Surprisingly, game elements most associated with negative effects in education are also the ones that are used the most: Leaderboards, Badges and Points. Game elements which are intended to motivate can demotivate.**

Using game elements can be associated with a variety of risks and side effects, e.g. manipulation, demotivation, encouragement to show behaviour only when rewarded, replacement of intrinsic motivation by striving for extrinsic rewards, game optimization instead of concentration on the task and increased disclosure of information.

Awareness of possible negative effects of gamification is important in several ways in the context of teaching and learning. Teachers who use game mechanics to make their scenarios motivational must know that positive aspects are not guaranteed and can turn into the opposite, e.g. a gamified teaching scenario can lead to learners being overwhelmed or distracted if the game and learning context are not sufficiently aligned. Learners must be made aware of negative consequences of gamification in order to prevent them from getting into a flow that distracts them from the actual learning goal or even causes effects (e.g. envy, fear) that hinder the learning process.



Studies on gamification mostly refer to the evaluation of single projects and their positive results without critically examining possible risks and side effects[16] [17]. Answering the question of what risks and side effects can be associated with the use of gamification is crucial to the decision whether and how gamification is used. Thus, the study follows the research desideratum that potential negative, adverse or non-preferred effects of gamification should be explored[16]. To this end, it is imperative to look at the so-called Dark Side of Gamification (DSoG) by questioning what risks and side effects are mentioned in this context and what alternative terms exist. The DSoG is made accessible via a literature review with the aim of identifying the horizon of possible risks and side effects of gamification. Another question aims to identify necessary keywords on the research gap for further analysis. 17 relevant publications were identified in three steps, which deal with the term DSoG. These were published in the years 2015 to 2020. Within these publications many risks and side effects are declared, which could be caused by gamification. In a group discussion among experts in the field of Game-Based Learning, those wereassigned to the jointly formed categories behaviour, motivation, intention, performance, data and emotion. An overviewsensitizes teachers to possible risks and side effects so that they are considered before gamifying. To answer the second question, the alternative terms were clustered. These range from negative effects, consequences, outcomes and impacts to implications and issues as well as other DSoG alternative terms that cannot be further clustered. These potential keywords will be used in a future comprehensive search for risks and side effects outside the DSoG.

# The GATE:VET Wiki – A Platform for GBL Concepts and Ideas

Learning should be fun and the use of Game-Based Learning (GBL) activities in the classroom can be easy. As many articles in this handbook show, games can enhance the learning experience, increase students' motivation and playing can function as an active learning activity. Thus, it can be beneficial to include some gamified materials and activities in teaching practice, given the principles of GBL theory are applied, but teachers may have asked themselves questions like: What's with all the terms and theories? Do I have the time to get my head around this?

We believe they can definitely get their heads around this and it requires less time than one would think. With GATE:VET, we want to support teachers at schools in expanding their methodological repertoire. We want to show them how they can enrich their classes – from introducing basic gamified learning activities into their everyday practice to developing elaborate serious games.

Therefore, we developed a platform where teachers have the opportunity to find game-based teaching materials, develop and adapt them to their needs and then use them in their own lessons. The theoretical definitions and explanations of game-theoretical content are linked to a variety of practical examples. Furthermore, users can interact with each other on the platform by adding comments or questions to existing entries and share their own ideas with other educational professionals. The wiki already contains some exciting resources, which can be used right away.

By the way, entries and resources can be added in any language and we have resources in French and German already. The browser extension Google Translate can be used to translate our wiki in more than 50 languages. We invite everyone interested in GBL to create, share and comment on the resources provided on our wiki!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GATE:VET Wiki
Learning should be fun and the use of game-based learning activities in the classroom can be easy. Games can enhance the learning experience and playing can function as an active learning activity. Students are more motivated to learn when their creativity is stimulated. It is great to include some gamified materials and activities in your teaching practice, but it is sometimes difficult to find suitable materials. You may have asked yourself questions like: What's with all the terms and theories? Do I have the time to get my head around this?
We believe you can definitely get your head around this and it requires less time than you would think. With our project GATE:VET (an Erasmus+ Strategic Partnership) we want to support teachers at vocational schools in expanding their methodological repertoire. We want to show you how you can enrich your classes – from introducing basic gamified learning activities into your everyday practice to developing elaborate serious games, whichever way suits you best.
By the way, you can add entries and resources in any language. For example, we have resources in French and German already. You can also use the browser extension Google Translate to use our wiki in more than 50 languages.
There are two main ways you can use the wiki:
Learn about Game-Based Learning by exploring theories and definitions
Learn about Game-Based Learning by checking out practical examples
...our glossary terms give you all the background infos
...our educational sheets show how Game-Based Learning works in practice
Get Started:
Create your own wiki account.
Download our mobile application (available for iOS and Android) to familiarize yourself with the topic in a gamified way, available for:
Help us build a GBL community by commenting on existing content and contributing with new content (you'll need an account and login).

# Endowing a Game-Based Learning Hub for Augmenting Teaching and Learning: Design, Constellations and Perceptions from a Teacher's Perspective

*Petros Lameras*

**What are teachers' experiences of using GBL and how do such experiences influence practice?**

Key findings were that teachers' perceptions of GBL were varied from retaining knowledge into memory and helping students to understand the topic to addressing a learning goal and developing constructive competition. Teachers' approaches to using a GBL hub spanned from searching content and discovering GBL for creative use to creating GBL communities.

Research insights can be applied in practice by utilising the mapping between teachers' perceptions of GBL and approaches to using a GBL hub would encourage the design and categorisation of GBL content to align with teachers' actual practice most meaningful and relevant to them. An interesting study would be to build on these preliminary findings and identify perceptions and dimensions that would be inclusive and hierarchically structured delineating a more developmental set of GBL perceptions and approaches along with their influences. Limitations arise from our study in terms of its context-specific nature that may not be generalisable to other contexts. However, in that it revealed, teachers' perceptions of GBL are instrumental in better understanding approaches to using GBL which in turn would inform the design of GBL systems and resources. Teachers would be keen firstly to understand what GBL means to them and how it connects with their teaching conceptions, strategies, and processes. The results from our study showed that teachers had varied conceptions of GBL

spanning from helping students to register and retain knowledge and gain understanding of the topic to developing a sense of competition and attaining an in-game learning goal. These varied conceptions may be mapped to approaches to teaching GBL from searching and accessing GBL contents and discovering GBL resources for creative use to creating GBL communities. A community-based structured to GBL is the key for helping teachers to gain an awareness of and develop a conception for GBL. Learning from others, sharing, reusing and repurposing GBL activities and content as well as providing feedback on GBL models, features and engagement mechanisms may pave the way for a more community-based support to GBL development and training.

An online hub for teachers to easily find and retrieve GBL content would be central. Of course, teachers would need guidance and support on how such resources could be reused and repurposed hence the development of a GBL community of teachers would alleviate the challenge of finding ways on how to best utilise GBL. GBL is more than a set of tools, strategies, or features, it is about encouraging creativity, empowerment, resilience and situating learning into a context. To this end, we have created a mapping of teachers' conceptions of GBL with approaches to GBL teaching. The table on page 31 illustrates the mapping between conceptions and approaches in terms of offering a paradigm of how different conceptual under-pinnings may resonate with actual GBL implementations.

To support the discovery of GBL content for creative use teachers may retrieve content-based games and gamified assignments that would inspire how to represent and visualise content creatively.

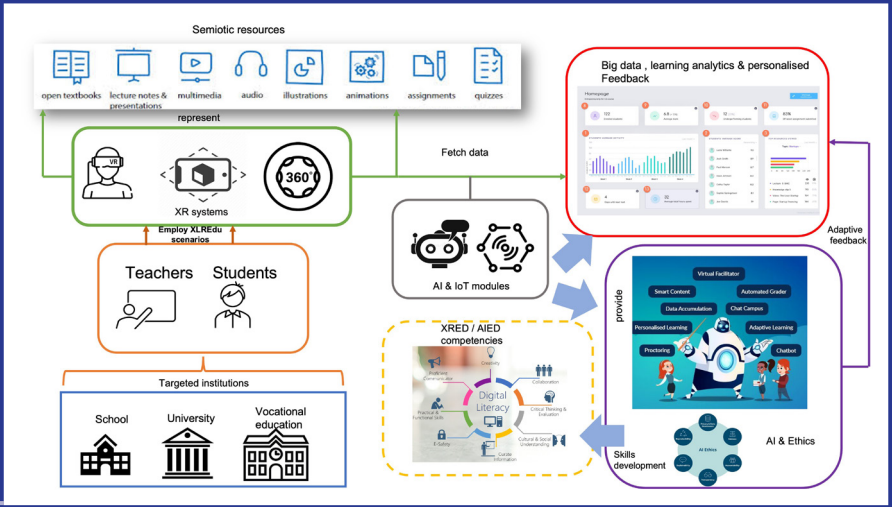
GBL communities around different ways of

representing, visualising and assessing GBL content may be formed. In theme B, the focus is on understanding the topic hence searching for applied-based GBL and context-aware games would enable use of GBL for complex meanings. Discovery of GBL resources for creative use may encompass repurposing lesson plans and gamified simulations with problem-based scenarios. Community development would convey GBL aspects around applying theory into practice. In theme C, associating learning goals in GBL is in the foreground of participants' experience. Searching for gamifying learning outcomes would enable teachers to assign GBL learning goals. Discovering GBL for creative use may be in the form of mapping goals to GBL templates. Communities around how to design and represent goals in GBL would assist in the design of goal metrics. In theme D, the focus is on constructive competition as a process of instigating progress and collaborative mechanisms for learning development. Searching for competitive GBL would highlight the competitive and collaborative elements of the perception. Discovering GBL content for creative use could be around game design collaboration templates. Community building for supporting GBL would help on designing creative GBL for promoting competition and collaboration.

**GBL can...**
*provide a process and a pedagogical approach to learning and teaching in playful and context-based ways. GBL is all about activities, self-direction and acquiring a gameful perspective to learning.*

**GBL cannot...**
*replace or substitute the essence of formal learning and teaching which is having specific learning outcomes, assessment and feedback. And cannot be applied in all learning situations, to all students and in all subject areas and topics. Teachers need to know how their students are learning and how learning should be designed to be transformed into a GBL activity.*

An ecosystem for using immersive technologies for education




Mapping GBL theory to practice

| | A: Searching for GBL content | B: Discovering GBL for creative use | C: Creating GBL communities |
|---|---|---|---|
| **A: Registering and retaining knowledge** | *Memory games, non-interactive content-based games, gamified slides, books and assignments* | *Content-based games, game designs that focus on content, gamification processes for assessing acquired information* | *Communities around broadcasting, and visualising GBL information and knowledge* |
| **B: Understanding the topic** | *Applied-based GBL, context-aware games, gamifying a field trip resource* | *Gamified simulations, mobile games, GBL lesson plans performed outside the classroom* | *Communities around applying theory into practice via GBL content* |
| **C: Attaining a learning goal** | *Trial and error games and gamifying learning outcomes, gamifying grades, virtual rewards* | *Games with scoring elements, victory and loosing conditions; role-playing scenarios, narration mechanics* | *Communities around designing in-game learning goals to GBL, reusing / sharing successful GBL goals* |
| **D: Developing constructive competition** | *Competition-based GBLs, action games, co-op games, scoring & leader-boards, timer mechanics* | *Creativity-based GBL, game design templates, game engines, collaborative & mechanics, gamified peer-assessment* | *Communities around collaborative GBL teaching. Visual ratings and textual feedback for assessing GBL* |

# GBL in Practice:

## Forbidden Words

"You know this ~~game~~. It is a fun activity you can [do] with your students in class. It can be useful for students to refine their knowledge about specific terms. One person has to [describe] a term without using any of the five terms listed below."
Please check out our **wiki** for a more detailed explanation on how this game can be created and various examples of how it can be best used in class.

COPY THE PAGES AND CUT OUT THE CARDS

**GAME**
*FORBIDDEN WORDS*

- play
- cards
- taboo
- words
- explain

| CHANCE | PUZZLE | ICEBREAKER | CHALLENGE | COLLABORATION |
|---|---|---|---|---|
| game | piece | activity | accepted | together |
| dice | table | short | Iron man | group work |
| luck | game mechanic | warm-up | competition | community |
| win | solve | north pole | goal | ally |
| opportunity | picture | introduction | difficult | support |

| ANALOGUE | FEEDBACK | KAHOOT! | MEME | SERIOUS GAMES |
|---|---|---|---|---|
| digital | together | quiz | picture | learning |
| old school | group work | classroom | funny | education |
| blended | community | mobile phone | social media | unconventional |
| face-to-face | ally | short | popular | play |
| technology | support | feedback | cats | motivation |

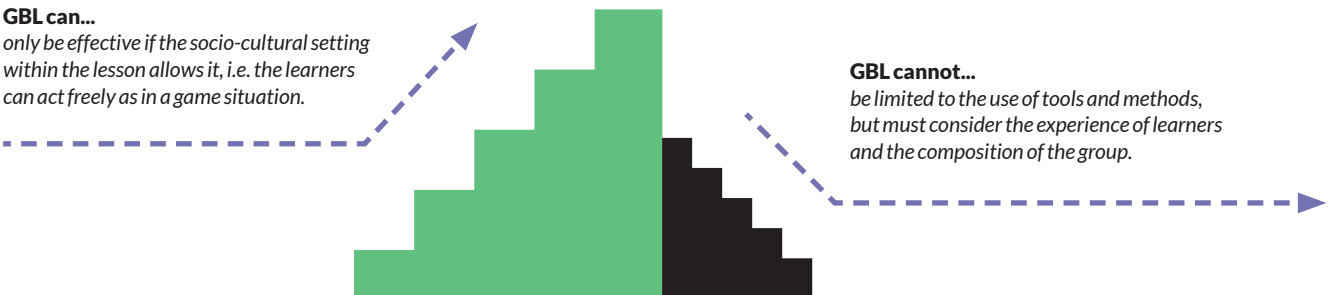
| SIMULATION | REWARDS | ESCAPE GAMES | MICRO LEARNING | BINGO |
|---|---|---|---|---|
| scenario | prize | room | short | grid |
| interaction | motivation | locked | online | numbers |
| virtual | badge | puzzles | mobile phone | balls |
| reality | points | collaboration | content | luck |
| test | success | clues | activity | correct |

# Tools vs. Culture. Relation between Playfulness and Gamification in Education

*Helge Fischer*

**Playfulness is a concept that can be applied to different entrepreneurial and/or educational contexts.**

Playing is increasingly prominent in our society; and gamification - i.e. the use of game elements in non-game contexts - has become a common practice in many contexts. Scientific reflection, however, is increasingly revealing the limitations of the concept. On the one hand, undesired side effects of gamification are emerging (Dark Side of Gamification) and on the other hand, it is becoming clear that the application of gamification in everyday education and business is only effective if the socio-cultural context allows it. This draws focus to the concept of playfulness. The academic discussions on playfulness have recently been revived, especially in organisational research, due to the demand for new organisational forms that promote agility, resilience and self-organisation in the context of the digital transformation. Playfulness is the basis for gamification and shifts the research focus from tools to the socio-cultural aspects of playing.



Games have a positive effect on the learning motivation, can create flow and counteract frustration or boredom. Failure is accepted as "part of the game" and provides the impetus for new attempts. On the cognitive level, games can prevent overload, promote knowledge transfer through situational and narrative embedding of information or accommodate different learning styles through adaptivity. The pedagogical discourse on GBL and gamification in learning is strongly limited to the use of games, game elements and tools in teaching situations and focuses less on the socio-cultural framing of games. Games are also organisational and interactive formats in which social practices are manifested. This means that games do not automatically result from the integration of badges, points and leader boards, but are facilitated by the socio-cultural context. Osterweil[18] defines the *Four Freedoms of Play* (freedom to fail, freedom to experiment, freedom to effort and freedom to change identities) as a prerequisite for organisational play. Warmelink[19] goes even further in exploring the characteristics of playful organisational cultures by examining online game communities in terms of organisational theory and deriving the following characteristics of playfulness: Contingency, Equality, Conviviality, Meritocracy, Agility and Teachability. The requirements for the design of game-based teaching scenarios can be derived from this research. Educators should therefore focus on the context of the teaching and learning situation prior to the use of GBL and ensure that playful education can be experienced by the participants.

MORE INFO HERE

# Re:construction* – A Motivating and Successful Start into Studying Engineering

*Anna Seidel, Franziska Weidle, Claudia Börner*

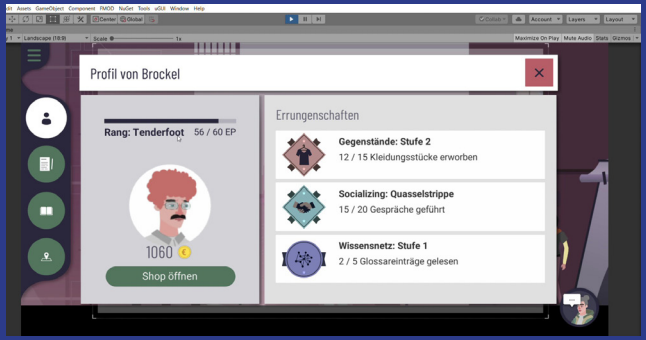
**How to get students excited about engineering and, at the same time, facilitate sustainable learning by using games?**

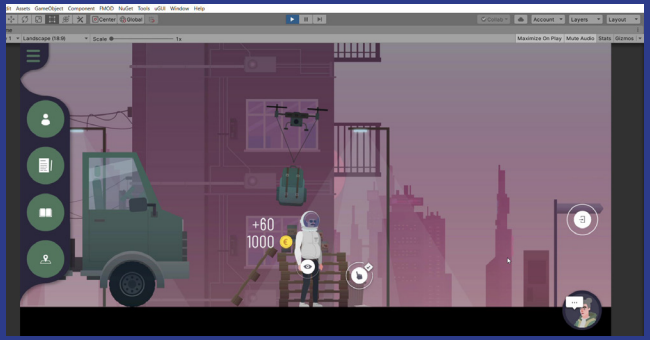
In 2018, the project *Learn&Play* began with the question of how students can be made aware of and prepared for engineering contents. As particular challenges we identified a lack of imagination, varied solution options and the high workload in engineering mechanics (a basic subject in engineering), in a questionnaire taken by 150 engineering students. In addition, the high degree of abstraction of the contents and the at times difficult transition from school to university teaching are also noted in the literature. Game-Based Learning (GBL) is particularly well suited to address these challenges because it combines elements such as visualising contexts, relevant practical tasks, micro learning and practice, creating good learning experiences, social learning and rewards.

**The project is funded by the European Social Fund (ESF) and the Federal State of Brandenburg via the Brandenburg Ministry for science, research and culture.*

**GBL can...**
*promote individual, time and place-independent learning as well as motivation for a topic when it is adapted to the needs of the target group.*

**GBL cannot...**
*be successfully applied without tailoring it to the needs of the target group and without coherently situating and reflecting on it in a teaching/learning.*




Interviews, questionnaires and playtesting with the target group were conducted in each development phase to ensure a good fit of the learning game with the needs of the learners. When creating the game concept, we were guided by scientific theories such as the *Input-Process-Output model*[20] or the *Foundations of GBL*[21].

Teachers can use GBL elements as learning preparation, follow-up or during lessons. Besides their integration into our game *re:construction*, we also post the learning videos separately on YouTube and upload all other materials on the Moodle learning platform so that the learning content can also be applied in other contexts. For teachers to find out about the learning game, we actively engage in public relations, participate in conferences and maintain a lively exchange with our two partner schools and a network of university teachers.

We are currently finalising the project. Now only content-related errors and usability are tested and improved. From November 2021, the follow-up project *Teach & Play* will focus on embedding *re:construction* in formal teaching/learning contexts and how teachers can be supported with additional materials to embed the game content in their lessons.

## GBL in Practice:

# STEAM - Serious Game to Train Experts in Advanced Multimodality

The STEAM online game is a serious game designed to train experts in advanced multimodality. Players have to select answers during a discussion. The number of right answers gives them access to selected modalities. Each modality combines a strategy, a tool and a learning environment. To give an example: a strategy can be collaborative learning, the tool could be a blog and the learning environment a classroom. The game suggests different combinations, ranging in difficulty from low to advanced levels of learning. There are many scenarios and stages, from which the players have to select a combination. By answering correctly, players can progress in the game. The possible combinations depend on the educational objectives of the particular scenario.




MORE INFO HERE

## GBL in Practice:

# STEAM Escape Room - An Adaptation of the STEAM Serious Game

Escape Rooms can be used to explore a wide range of topics with learners in a completely different way. Most Escape Room scenarios start with a background story. The case presented here, for example, is a scenario that enables you to practise the basic principle of an Escape Room with your colleagues, and at the same time make them experts in multimodality.

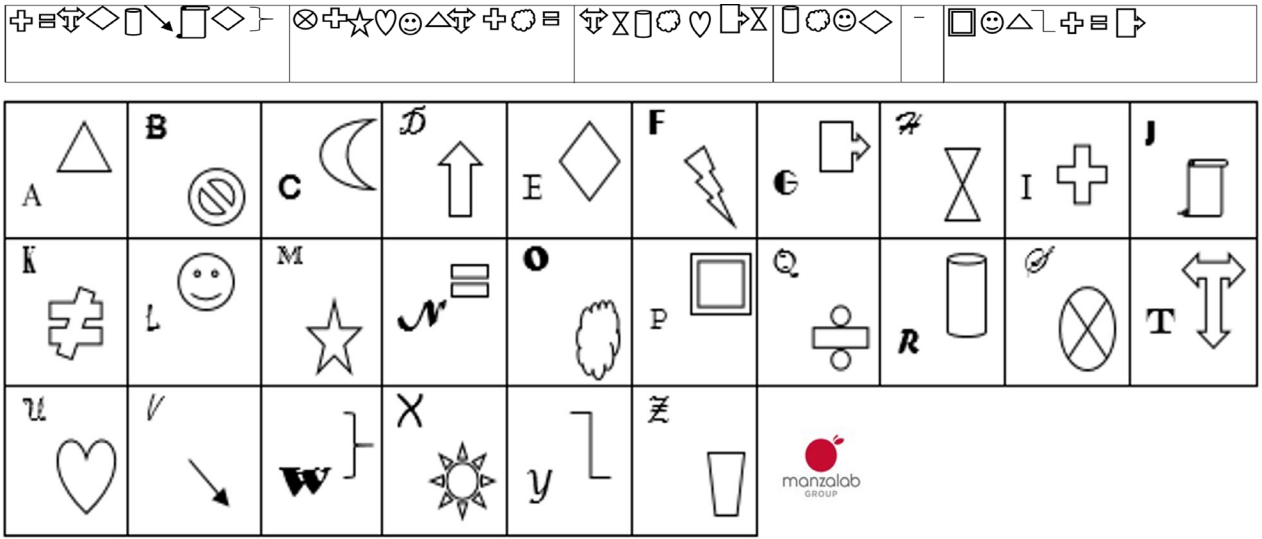
**You may use this background story when playing this escape room with your colleagues:**

"Your students have complained about your old-fashioned school methods to the administration of Charles Darwin high school, who are asking you for an explanation. You decide to conduct the next courses differently to make your students smile again by applying the principles of multi-modality. It is not a matter of them keeping a bad image of these first courses. Worse still, they desert the place.

But first you have to secure your position by presenting one combination of engaging modality with the corresponding implementation scenario at the administrative meeting held in 45 minutes. A combination consists of a tool, a strategy and a location. You have to find them all in the room. When you get them, identify the perfect match between the right combination and the right scenario to illustrate your choice and prepare your interview with administrative staff."

Have you ever faced this situation before? Don't panic! More experienced colleagues have offered their advice. Organize your time and work in groups to manage this situation before time runs out. Don't forget that in 45 minutes your destiny will be settled. But it's going to be fine!

*The complete STEAM Do It Yourself (DIY) Kit provides you with all the materials you need to create your own individual Escape Room scenarios for your students.*



# Narration Design in Educational Games

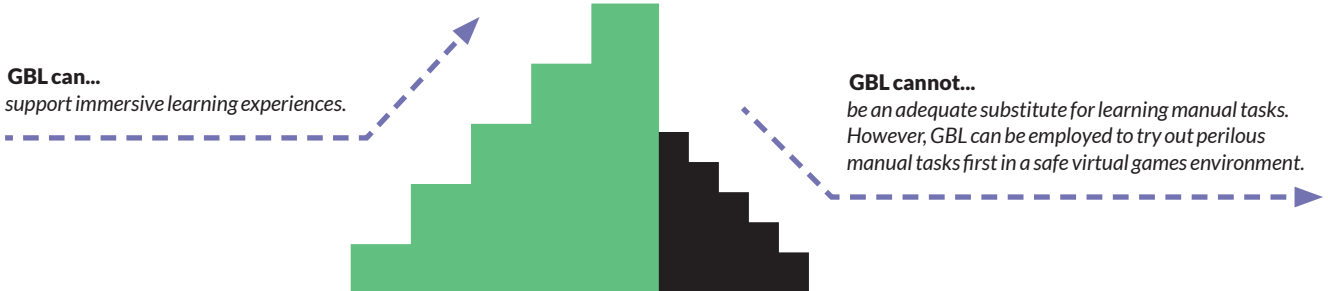
*Theresia Zimmermann*

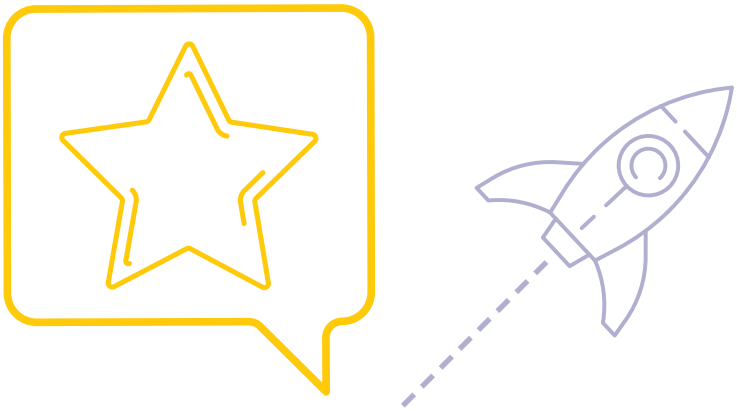
**To what extent may (interactive) storytelling contribute to an immersive learning experience?**

Narratives provide an opportunity to convey intended messages. To ensure that the author's message is understood by all players, a linear narrative structure may be the best option. Interactive or adaptive narrative structures, however, allow the story to be tailored to the individual player. Integrated details should always be relevant to the game context itself and the game's target audience.

Storytelling can also be used as a method that allows students to explore their own narratives. Their own interactive stories can be created by using open source software such as Twine. Game-Based Learning can be used to experience scenarios that would not be possible in the conventional classroom environment. Students can try out different courses of action in the role of fictional characters and experience the consequences of these decisions in a simulated world.

To help teachers with developing an awareness of using GBL in their practice, regular information events could be organized, such as workshops where teachers can also try out games and applications themselves.





## GBL in Practice:

# Stressrekord - A Serious Game for the Reduction of Mental and Physical Strains of Nursing Staff

The game is developed as a browser-based application so that it can run as a desktop version as well as on a mobile device. The aim of the learning environment is to teach prevention-related contents through a simulation of everyday work in a virtually modelled care company. Within the framework of the game, the learner is asked to deal with the strains and challenges to which nurses are exposed on a daily basis. For this purpose, the effects, correlations and interactions of work-related stresses and strains on nurses are presented in a meaningful way.

**The Game**

Stress-Rekord is a serious game/educational game for leaders in the outpatient care sector, which addresses issues related to healthcare prevention and health promotion. The overall aim of the project is sustaining and improving the physical and mental capacity for employment of nursing staff.

The project focuses on the outpatient care sector concentrating on the care workers who work directly in patients' homes, rather than those who work in hospitals or nursing homes. These outpatient care workers suffer from even higher levels of stress due to the changing work environments and the high time pressure they are under, as they have to reach their patients by car.

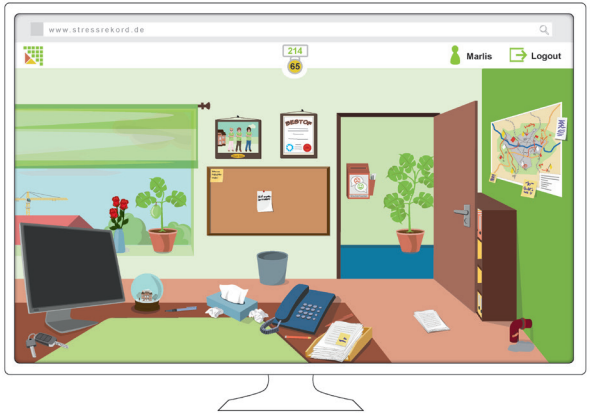
The second focus is on managers in outpatient care who are responsible for maintaining the health of their employees. It is primarily their responsibility to create a healthy working environment for their staff.

The question is how we can enable the managing staff of outpatient care services to learn how to generate this healthy work environment. To achieve this goal, various partners from the health sector were involved in the development of the resource. These included, for example, a care service and a training provider.

## How it works

When a player enters the game, they find themselves in an office fulfilling the role of a manager of a fictional nursing care service. Every activity starts in the office and it is the player's task to identify and reduce all strains and health issues from which the characters in the game suffer. In order to fulfill the learning task the player has to follow four steps that repeat until they have reached the goal of the game. The game also includes knowledge base or library, which the player can enter at any time. There, all relevant information on work-related stress can be found, including facts and figures as well as specific effects of stress.






MORE INFO HERE

# Using Games as Medium for Teaching Software Development

*Marius Brade*

**The biggest surprise researching this topic, was that during the process of designing a game and bringing it to life, students did not realize that they became very good designers for any software. This needs to be actively reflected by teachers.**

Using Games as medium for teaching software development has several advantages. Students have a high motivation to create games, despite the fact that this is a challenging task. Players have high expectations; they want to experience a flow state while playing a game. Creating a flow state for players means a lot of testing for creators of a game. A user-centered design process seems like the most effective way to find out about respective design decisions leading to a good game. The same aspects lead to successful software applications in general. This means that students learn all the needed methods and skills to create not only games but also software in general – and in a particularly motivating way.

The following methods were used: Students had to come up with a game idea, which then should be pitched to their peers. This way groups of students could find common ground for building teams. Then the teams had to work on the game design process for two weeks before a school class came to give feedback and test the first bits of the games. This process was iterated throughout the semester. The biggest challenge in the project was students thinking their idea is not ready to be tested/reviewed yet, and that they needed to further work on it before showing it to others.

MORE INFO HERE

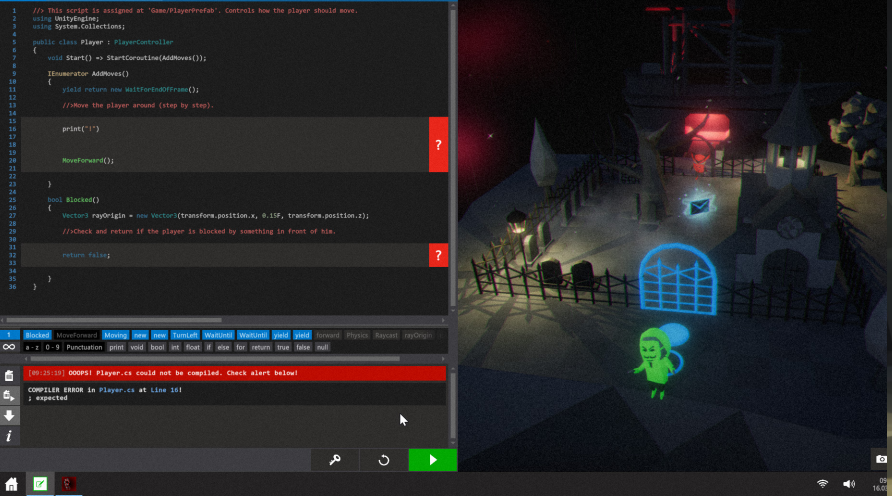
# ENC#YPTED: An Educational Game for Programming in the Unity Engine

*Vincent Schiller*

**How can a digital game-based learning application for learning programming be designed to be as user-friendly, motivating, and extensible as possible?**

ENC#YPTED was designed user-centered, which proved to be highly effective as usability difficulties were noticed and improved interactively during development.

It was found that the game has a high motivational potential, as the subjects tested a level for over two hours in some cases, despite the difficulty being too high. Nevertheless, the testers stated that they were always motivated and entertained, which is why a flow experience can be assumed. As has been shown, the knowledge transfer of the prototype is rather slow due to the extensive playing time with comparatively few topics covered. This balance between entertainment and knowledge transfer shows one of the biggest challenges in the implementation of such an educational game. However, due to the high motivation potential, it can be assumed that the entry hurdle is easier to overcome for programming beginners.



For this reason, it can be used in teaching as an effective introduction to the often-feared subject of programming. To analyse how such a programming learning game can be designed to be as user-friendly and motivating as possible, similar, already existing game concepts and underlying neurological principles were examined. In addition, interviews with test players were conducted several times during the development process to further improve the application in a user-centred way. The test persons were observed playing the game and then asked about their user experience.

Future research is needed to determine and possibly optimize the actual learning success of the application, including a broader use of the system in the context of standardized UX tests on a large sample.

To accomplish this, additional game levels and improvements are already in the planning, which will soon be used and evaluated by students in the Game Design lecture for Unity Development at the University of Applied Sciences Dresden (FHD).

# Mobile Games as Support for Digital Design Students

*Yann Tambellini, Stéphanie Philippe, Valérie Radelet*

**How can a gamified learning application for mobile phones be used to assist students to focus on the content in the classroom and support them at home?**

CREASUP DIGITAL has recently been launched to train future digital design professionals. Its uniqueness is the focus on professional competences and knowledge. There are no books, no notebooks and every evening the students are invited to complete new activities in a mobile app to consolidate the knowledge they learned that day.

The app offers a set of various training activities: mini games, articles, videos, quizzes, flash cards. These help to break down the content into small units that trainers design according to their pedagogic objectives. Trainees are encouraged to complete the activities to collect badges and can monitor their progress in the leader board.

The app also supports the daily communication with the students and can be used to share information or updates. Further it can be used to conduct surveys and collect feedback.

The mobile app appears to be a flexible and useful tool to revitalise the school year, and has proven particularly relevant in the context of the hygiene requirements of 2020.

**GBL can...**
*help students discover the theory of a new concept, idea or topic and go beyond what was presented in class by the teacher or trainer.*

**GBL cannot...**
*provide knowledge on the use of specific tools and software; this would require gaining practical experience via hands-on sessions and actual content creation.*

The main purpose of making the app available to students was the provision of support for their training, especially for teaching theories and backgrounds. Practical subjects, such as using dedicated software for content creation, are addressed via hands-on sessions to enable direct experience. The mobile application has been useful to support teachers' communication with students.

Our target users are first year students of the Discovery program (a total of 45 participants). At school, students have theory lessons, supported by slides. They are asked not to take any notes during the courses and the slides are not sent at the end of the courses. At home, students are invited to use our mobile app. Generally, five activities are recommended each day. The content provided corresponds with the topics introduced at school; additional content was added for students to discover further topics. Topics include Hardware, Design, 2D-3D, Production, Innovation, Business, English, Professional life. Quizzes are used as formal assessment instruments to regularly evaluate the progression of participating students. News and Surveys are used to communicate with students and get their feedback about various activities.

The use of the gamified mobile app as a supplement to school-based training has shown the following advantages: The courses are generally easy and smooth. The students are motivated by the leader board and challenge each other as well as their trainer. News and surveys create interactions with the students. The app also helps to identify questions and topics that learners find particularly difficult, which can consequently be given more attention in class.

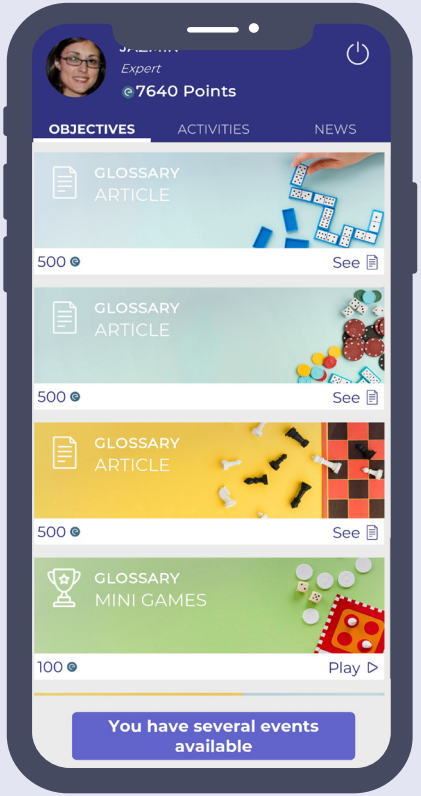
# GATE:VET App

One of the main outputs of the GATE:VET project is our GATE:VET app, which is available on iOS and Android as well as a web version through WebGL. The web version of the mobile app offers users the option to work on a larger screen, to facilitate easier gameplay and the interaction with content. Essentially, the app has the same goal as the wiki: To provide teachers with insights into the theory and practice of GBL and to support them in gamifying their teaching.

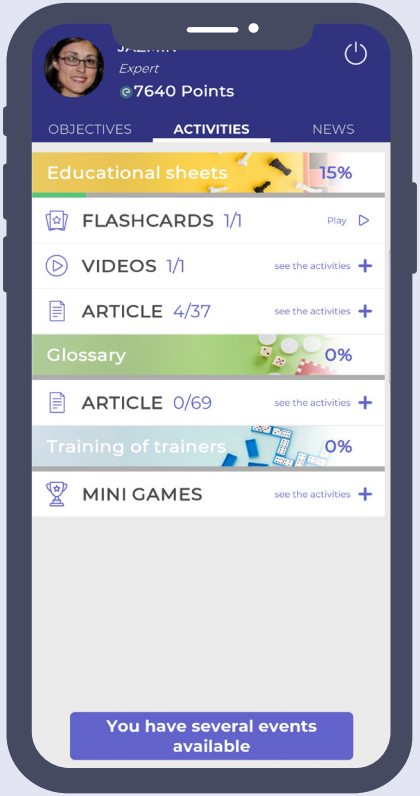
The GATE:VET app is itself gamified and based on a micro learning approach. Organized as a toolbox, short articles on relevant topics as well as mini games, flash cards and quizzes are available to assist teachers in better understanding GBL. Various activities are designed to develop teachers' abilities to implement gamified activities in their teaching practice. The activities require minimal time and users can monitor their progression on the leader board. They can also collect points, badges and awards.

The interface of the application provides users with various access points to the content: objectives, activities and news. Users can learn about the more practical side of GBL in educational sheets and the underlying concepts or theories in the glossary section. There is also the option of undertaking a training of the trainer activity to work through the contents in a guided way and to learn how the new knowledge could be shared with colleagues. Flashcards, articles or mini games provide the user with an opportunity to test their knowledge about the new subject matter. Mini games may be designed to test memory, vocabulary and knowledge on GBL tools, processes and strategies to be implemented in the classroom. Furthermore, a search tool (using a search bar based on predefined tags), a rating tool (using a 5-stars rating option) and a bookmark tool (to save content) facilitate exploration of the content.

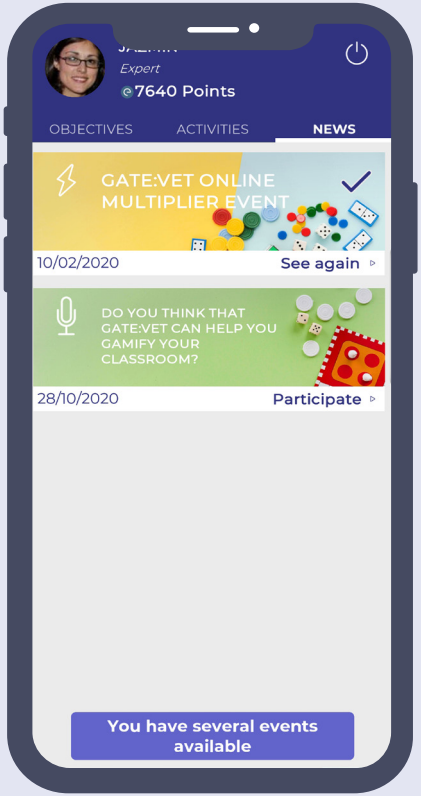
iOS Android WebGL




This section offers a selection of recommended contents for every user thanks to an algorithm.




This section gives you access to all the contents (video clips, games, flashcards, articles, etc.) It also shows the level of progression for every theme.




This section presents the last articles, news or video clips published.

# “Cité Apprentie” - An Immersive, Innovative and Numeric Experience

*Mario Horvat, Aurélie Gimbert*

**Does a GBL approach succeed in involving people who have difficulties with the classical teaching approach?**

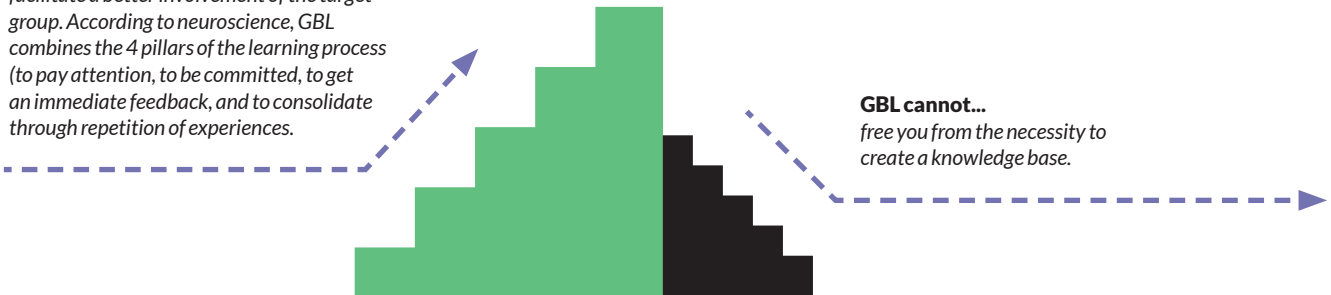
The objective of the project is to prepare young people to sign a training contract in the field of customer service in hospitality and tourism. The idea is to help the trainees to work on self-awareness, self-confidence and soft skills development with an innovative pedagogic approach, mainly a game based approach. The second part of the path is focused on the preparation of the professional project of the trainees.

The main target group of the project are young people who are out of work or NEET (Not in Education, Employment, or Training).

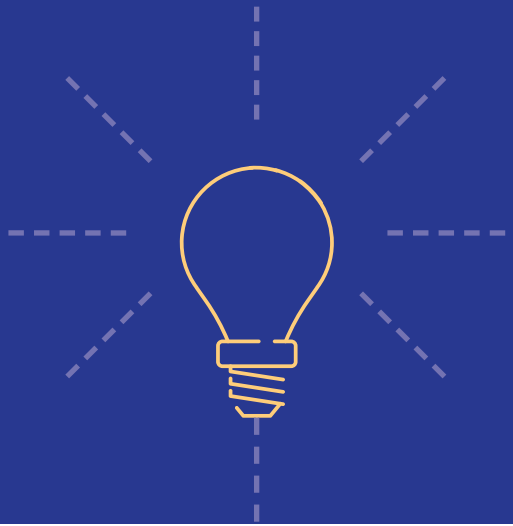
The insights can be applied in teaching practice connected with soft skills development for people excluded from work. The tools and methods developed could be used and adapted to other contexts.

One of the project outputs is a kit containing a description of the methods and tools developed during the project. This kit will be produced to assist teachers to reuse and adapt GBL material and developed contents

**GBL can...**
*facilitate a better involvement of the target group. According to neuroscience, GBL combines the 4 pillars of the learning process (to pay attention, to be committed, to get an immediate feedback, and to consolidate through repetition of experiences.*



**GBL cannot...**
*free you from the necessity to create a knowledge base.*



**The biggest challenge for our work was the involvement of teachers. The main issues included:**

- ensuring that teachers are granted sufficient time to develop the pedagogical content;

- getting teachers to adapt or even change their teaching practices to use GBL tools and methods.

# VUC Storstrøm

*Maria Storm-Holm*

## A Hybrid and Gamified School

At VUC, we try to incorporate Game-Based Learning and Teaching as a natural part of learning designs and teaching. To motivate and inspire the students attending school and to help them succeed with their education we bring both analog and digital games to teaching, e.g. E-sport, VR and Active Floor.
Furthermore, at VUC we have established a new Nordic Center for Digital Andragogy, which, among several other usages, offers courses including participation of foreign visitors, e.g. in connection with Erasmus+ projects.

Getting further knowledge and experience about GBL and teaching, it becomes increasingly obvious how important it is to incorporate games in your teaching. As a teacher, it is important to think differently about how you define successful teaching, e.g. in regards to the loss of control – when handing control over to the students, that you know they are playing and you as the teacher can still be confident that they are learning something.

**GBL can...**
*provide motivation and help students succeed with their education - which may lead to an improvement of the social mobility in a country.*

**GBL cannot...**
*replace the teacher.*

Incorporating GBL in teaching as a natural part of the classroom is crucial, as it can help motivate students to attend school and improve their learning outcomes. To equip teachers accordingly, their competences need to be constantly developed, e.g. by strategically engaging with national and international projects as well as continuously developing and applying innovative learning designs to ensure varied groups of students can be supported.

MORE INFO HERE

# GBL in Practice:

## GBT_Project

The Games in Basic Skills Teaching (GBT) project is an Erasmus+ funded project that aims to explore the use of analogue and digital games in basic skills teaching. The project introduces games into the teaching of this specific target group, as games transform the classrooms in which they are used. They can create immersive worlds and offer challenging tasks while introducing a new form of interaction into the learning process. The project uses both analogue and digital games, approaches from simple role-playing games and card games to virtual reality games and augmented reality applications with game-like elements. The project team also considered issues like the integration of games into existing curricula and/or how best to deal with the time constraints imposed by established lesson structures. The project team shares their insights in the form of Open Educational Resources via multiple channels (e.g. Facebook and YouTube). They are also creating an open training course on CANVAS called *Changing the Game* to provide details on their systematic approach on integrating games in teaching practice.

GAMES
IN BASIC SKILLS
TEACHING

MORE INFO HERE

# How to Develop an Adaptive Learning Path for the Serious Game E.F.A.

*Cornelia Schade*

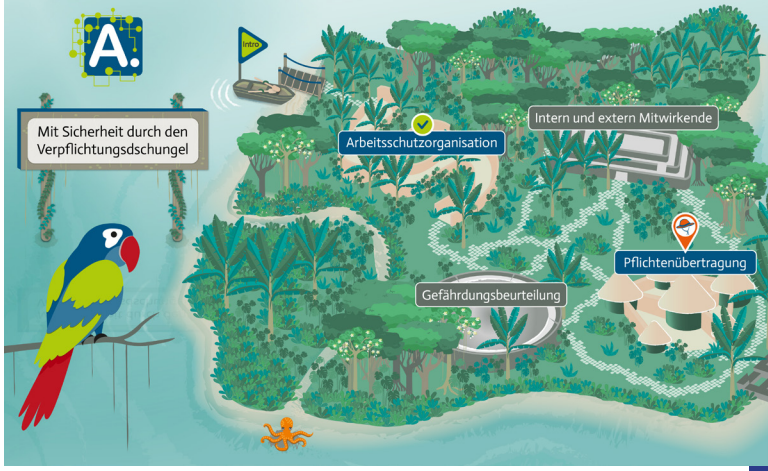
**One research question within E.F.A. is how GBL can be supported by adaptive learning paths and how these adaptive elements can be sufficiently developed in order to make learning more experiential and time-efficient.**

The serious game E.F.A. addresses the need of learning more about occupational health and risk assessment among leaders in the social service sector. The topic of workplace safety is often perceived as a jungle of obligations. The browser-based game E.F.A. wants to untangle this jungle and provide assistance for companies conducting a risk assessment.

One overall aim of the project is to design the serious game as an adaptive learning environment. Compared with traditional learning environments, adaptive learning systems have the unique quality of adapting to the needs of the learner. Vocational biographies nowadays tend to be more diverse, learners are more heterogeneous, bring along different prior knowledge and teachers are increasingly challenged in meeting these various needs. To address this challenge, the project explores the key activities needed for developing an adaptive GBL environment. Making E.F.A. an adaptive learning system has the potential to optimise learning in regard of the individual needs of the learners and moreover increase their flow experience and motivation.

**GBL can...**
*be a field in which the use of adaptivity and AI has high potential as it offers the possibility to meet the needs of learners with different backgrounds and different prior knowledge.*

**GBL cannot...**
*serve all learners' needs. The general attitude towards games and learning in a playful way has a high impact on the success of a Game-Based Learning system.*




The adaptive serious game can be used for further education purposes, especially for training leaders in health-related topics.

During the project E.F.A., a prototype of an adaptive serious game for workplace safety was developed. One key aspect of the development process was to discover how the serious game can be created as an adaptive game which adjusts to the individual needs of the learner. To focus the conception and development on this specific goal, the project team identified three baseline components the adaptive learning system needs – a domain model, a learner model and a tutorial model[22].

In the domain model, all information on the knowledge addressed in the game and what relations exist among this knowledge (is specific knowledge a prerequisite for other knowledge?) was collected. Later, those knowledge objects were translated into specific learning tasks, like mini-games, puzzles, quizzes. In the learner model, all the information on the learner, especially how they completed certain tasks (performance of the learner), were collected. In the tutorial model, the project team defined which different learning paths are offered and how certain instructions or contents adapt based on the learner model to provide individual assistance.

The attempt of creating an adaptive serious game leaves some questions open for further research. One question regarding the domain model is how to sufficiently validate that the prerequisite relationships between different knowledge objects found and defined by the team are actually prerequisite for the learner. The data collection on the learner's behaviour leaves the challenge as to how a sufficient value reflecting the learner's performance can be created and how this value can serve as a basis for choosing individual learning paths.

# GATE:VET Curriculum: How to Instruct Teachers to Use Game Elements and Game Mechanics in VET

The curriculum is an output of the GATE:VET project and aims to guide teachers to integrate games and game elements into their Vocational Education and Training (VET) teaching scenarios and to create gamified learning environments. The curriculum provides (VET) teachers an overview of GBL and presents basics, concepts, practical examples and procedures of gamification. In addition, teachers will be familiarised with the platforms developed in the project - the wiki and the app.

In addition to the curriculum, guidelines have been developed in German, Danish and Romanian. They include a summary on suggestions and recommendations on how teachers can gamify their lessons (with links to wiki and app) and provide information on the content, structures and implementation of the GATE:VET curriculum.

The GATE:VET curriculum was implemented during a three-day training-of-trainers workshop for teachers from Germany, Denmark and Romania. The participating teachers were trained to act as multipliers in their respective schools and design their own training programmes for the gamification of teaching content.

**GBL can...**
*help teachers to make their lessons more attractive and increase the motivation of the students.*

**GBL cannot...**
*convince every teacher of its benefits.*

How to gamify the classroom

FHD

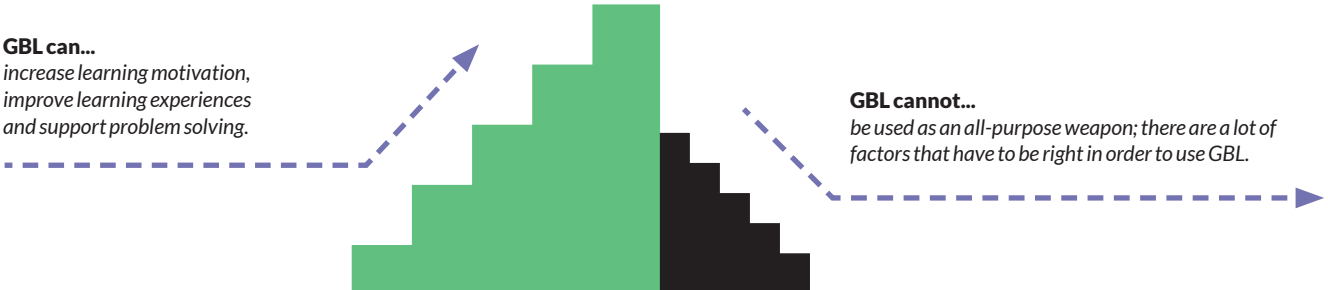
# Know Your Types: Connecting Player Types and Learning Styles in Game-Based Learning Settings

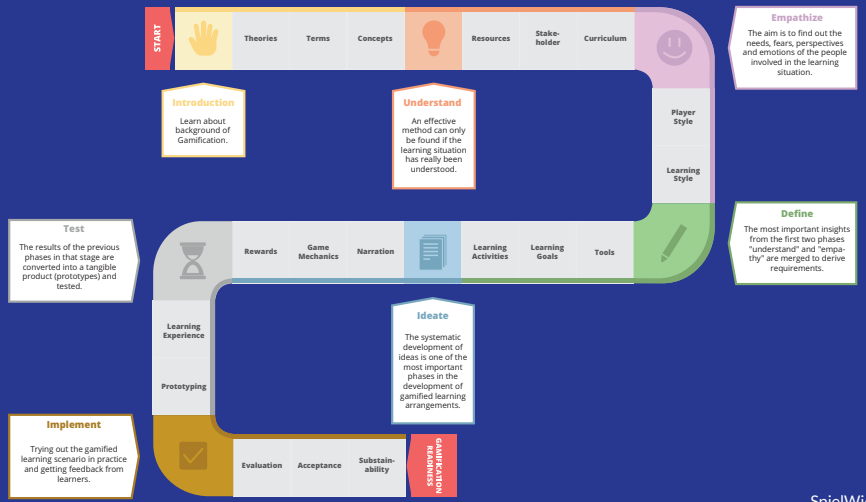
*Hélena Gottschalk, Corinna Zimmermann*

**Focusing on the perspectives of teachers interested in gamifying their teaching, a pathway on gamification was developed to support teachers in implementing GBL activities.**

Using game elements in a teaching setting to enhance the learning experience and the motivation of learners requires a closer look at the target group as well as the identification of respective learning styles and player types.

Each of the learning styles has particular characteristics, based on e.g. psychological reasons, which influence the development of individual learning methods. Understanding a student's learning style helps to improve the learning process, learning experience and motivation. At the same time, games and game elements have different effects on students and their learning behaviour. Knowing the player types of a group is essential for creating a Game-Based Learning (GBL) experience and increasing the learning motivation. As learning styles as well as player types partly have similar characteristics, teachers can determine which game elements can be used to address specific learning styles[23].






SpielWiese 4 Game-Based Learning in OPAL

Within our open online-course *SpielWiese 4* (Playground for GBL in the learning management system OPAL, available in German) we present a course on gamification: the different stations are based on the design thinking method and give an insight into what teachers need to consider when using GBL in their own lessons. We provided each station with fact sheets containing the most important information; these are continuously expanded. This material provides teachers with valuable insights into specific topics related to GBL.

To put all these insights into practice, the workshop concept *Parcours on Gamification* offers a starting point and helps teachers to engage with GBL.

As this course does not support the sharing of information or provision of assistance in solving problems arising from using it in classrooms, we started to build a community called edLUDO, which aims to bring together researchers and teachers to benefit from each other's experience. This community is supposed to become a platform where participants can share GBL scenarios and help to adapt them.

MORE INFO HERE

# Sylvester Arnab | Coventry University

Hybridity, Playfulness, and Game-Based Pedagogy

United Kingdom | Leamington Spa

My main interest has always been in experience design. Play and gameplay provide insights into how engaging and meaningful experiences can be designed. Game-Based Learning in particular opens up opportunity for experiential and active learning to be facilitated.

I am currently a full Professor in Game Science, where my research focuses on the design, development, and practice of play and game-based approaches in various sectors, but mainly in education and training.

I am a co-founder of the award-winning Game-Changers initiative (GChangers.org), which focuses on promoting a more holistic and empathic approach for co-creating, adapting, and adopting playful and Game-Based Learning. I am currently leading two international projects in Southeast Asia where we are investigating the impact of play and Game-Based Learning in STEM education and in the development of social resilience. We have recently proposed a framework for designing and reflecting on the mapping of the various aspects that could advance our understanding of what playful attributes could help develop competencies and capabilities (including wellbeing) for enhancing resilience.

Sylvester Arnab

# Maik Arnold | Fachhochschule Dresden

GATE:VET Project Team

Germany | Dresden

Game-Based Learning helps to activate creative thinking and provides students a safe environment for both learning from failure and developing their social, cognitive and behavioural skills.
My research interests include, amongst others, scholarship of teaching and learning, didactical applications of GBL, learning in VR/AR environments and digital education management.
Currently, I am working on an interactive roleplay to train social and intercultural competences in the hybrid classroom.

Maik Arnold

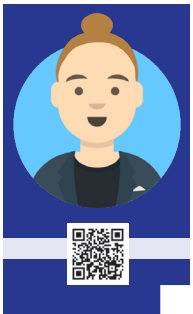
# Claudia Börner, Anna Seidel, Franziska Weidle | Brandenburgische Technische Universität Cottbus-Senftenberg

Re:construction - A Motivating and Successful Start into Studying Engineering

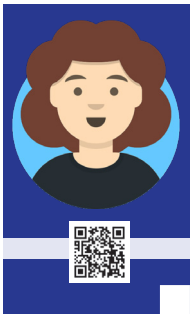
Germany | Cottbus

For us, Game-Based Learning (GBL) is interesting as a field of application of teaching-learning psychology and media didactics. Here, different theoretical concepts have to be transferred into practice and linked with each other. This results in complex, but also highly exciting structures that can yield new insights for game development and GBL on the basis of formative and summative evaluations.

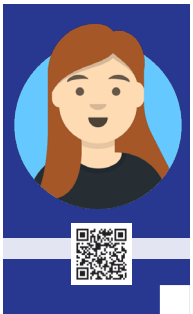
Currently, we are working on the completion of the learning videos, which provide an additional element in the game. In addition, a large part of our work is currently focused on error analysis and correction. In order to guarantee an interruption-free game experience, we are also working on appropriate help and hints that the players can fall back on in challenging and new situations.



Claudia Börner



Anna Seidel



Franziska Weidle

# Marius Brade | Fachhochschule Dresden

Using Games as Medium for Teaching Software Development

Germany | Dresden

I always found it compelling, how we learn and experience new aspects by “just playing around with things”. My professional and research interest lies in finding methods to connect people to their playful nature for problem solving in many domains.

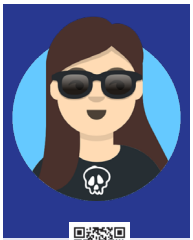
Currently we are pushing our *New Work Design Lab* which focuses on applied research at the intersection of game design, UX design and cognitive ergonomics and supports the whole process ranging from concept to realization. One of our projects is *DD-REGIOplus*, which focuses on raising awareness for UX design, gamification and prototyping for start-ups, so that products can be developed customer-oriented. Another current project is to support engineering companies through VR/AR training worlds to train their workers on the job.

Marius Brade

# Madeleine Diab | Akademie für berufliche Bildung

GATE:VET Project Team

Germany | Dresden



Madeleine Diab

Being passionate about board games and video games myself, I was always fascinated how games and game-like scenarios can help people open up and get involved when learning. When I worked as a trainer for cross-cultural competence for students, I used game-elements to target the affective and behavioural domain and prepare them for unexpected or unknown situations.

My main professional interest lies in transferring research results to actual teaching practice, advocating for experimenting with new methods and teaching styles and supporting teachers in implementing those.

In my work as a project coordinator, I am currently involved in several projects dealing with gamification, digital learning environments (VR) and curricula design.

# Helge Fischer | Fachhochschule Dresden

Tools vs. Culture. Relation between Playfulness and Gamification in Education

GATE:VET Project Team

Germany | Dresden

Helge Fischer

I studied Media Studies and Strategic Business Management and received my PhD from TU Dresden and the University of Bergen. I am a research associate at the Center for Open Digital Innovation and Participation (CODIP) at TU Dresden and a professor of business administration at iu International University.

I have been involved in various projects with digital Game-Based Learning and corporate gamification, investigating potentials of games in business and education. I pay particular attention to the cultural and organisational aspects of gaming, as I argue that gaming generates social practices that offer great potential for companies, especially in the age of digitisation and increasing uncertainty and dynamism.

# Corinna Zimmermann, Hélena Gottschalk | Technische Universität Dresden

Know Your Types: Connecting Player Types and Learning Styles in Game-Based Learning Settings

Germany | Dresden

We have been interested in Game-Based Learning (GBL) since we started working in related projects. We both got interested in it as learning by playing is the first thing you do as a child, but you forget about this method when you are constantly exposed to conventional teaching. Reactivating these childhood experiences may have a positive impact on some students' learning experience. Therefore, it is essential to have a closer look at teachers' mind-sets and support them using GBL in their everyday school life.
Hélena's professional interest is designing GBL workshops. Her research interests include GBL as well as gamification in the higher education context.

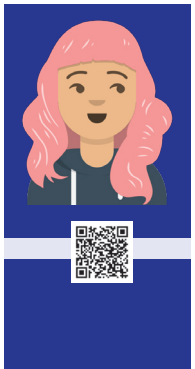
Corinna is interested in the mind-set of teachers; what do teachers need to think about before starting with GBL and what skills do they need.
We are currently working on a gamified study navigator for first year students at TU Dresden and the development of edLUDO, an online community for digital cultures of learning and play.


# Aurélie Gimbert | Campus des Métiers et des Qualifications
# Mario Horvat | Créativ

"Cité Apprentie" - An Immersive, Innovative and Numeric Experience

France | Dijon

One of the main objectives of the *Campus des Métiers et des Qualifications* is to impulse the change of the training contents to improve the skills matching between initial and vocational training and the needs of the local enterprises in the field of agroindustry, hospitality and tourism. That is the reason why we are interested in pedagogic innovation like Game-Based Learning. We carry on the work on developing game based tools with technologies like virtual reality in the hospitality sector training.



Aurélie Gimbert

Mario Horvat

# Matthias Heinz | Technische Universität Dresden

Gamification's Dark Side Horizon

Germany | Dresden

The perception of gamified situations in our everyday life, the added value that gamification can bring to learning processes and the power that game elements can have (e.g. the world's second largest economy plans to introduce a nationwide social credit system) got me interested in Game-Based Learning. My research interests are e-learning/blended-learning trends (especially gamification/ Game-Based Learning) in the area of higher and further education. Currently I am working on a gamified study assistance system and the analysis of risks and side effects of gamification.

Matthias Heinz

# Petros Lameras | Coventry University

Endowing a Game-Based Learning Hub for Augmenting Teaching and Learning: Design, Constellations and Perceptions from a Teacher's Perspective

GATE:VET Project Team

United Kingdom | Coventry

Petros Lameras

My research interests span the areas of games science and Artificial Intelligence in Education (AIED) research in general and within the research strand of investigating how learning and teaching in Science Technology, Engineering and Mathematics (STEM) may be enhanced with the use of games and AI. Teaching and learning aspects in relation to measuring, visualising, and analysing data (in-game learning analytics) on students' deeper learning assessment; as well as exploring metrics and indicators of tracking and monitoring teachers' ways of guiding learning and enhancing in-game assessment (teaching analytics) are perpetuated through applied game-based digital learning research.

I have worked as a researcher in European and national collaborative Research and Innovation projects exploring the use of technology in learning as well as the integration of games and digital content for developing authentic and meaningful teaching and learning experiences. I have been engaged in supporting and guiding teachers in designing, describing, capturing, and representing their teaching ideas by developing and evaluating games for science teacher training in using inquiry-based learning for improving students' scientific inquiry process.

# Josefin Müller | Fachhochschule Dresden

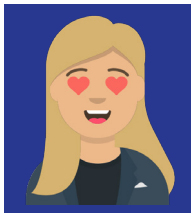
GATE:VET Project Team

Germany | Dresden

Games are part of my everyday life, I have loved playing analogue or digital games since I was a child. Therefore, I have always been fascinated by the effect games have on people and the enthusiasm they generate. Games and playful applications can be used especially in the field of education to impart knowledge, to increase the motivation of students and thus to support active engagement with the content and learning processes.

My research interests are wide ranging, including topics such as organisational development, digital teaching and learning, educational innovation and Game-Based Learning.

I am currently involved in several Erasmus+ projects dealing with curriculum development, inclusion in tourism and Game-Based Learning.

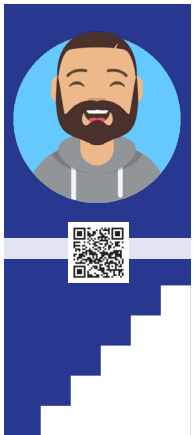


Josefin Müller

# Steve Nebel | Technische Universität Chemnitz

Recent Findings and Future Developments in GBL Research

Germany | Chemnitz



Steve Nebel

I deal with the design of digital learning media from a predominantly psychological perspective. My topics range from GBL, VR/AR and multimedia material to 360° learning videos. In this field, digital educational games are by far the most complex and unexplored learning medium. I am therefore currently trying to identify learning-relevant psychological processes of basic game mechanics. The aim is to determine parameters with which these mechanics can be optimally applied in the learning context. It is impossible, however, to predict what video games will look like in the future - similarly, it is impossible to predict how learning games will develop. This gives rise to the special attraction (and the special challenge) of constantly looking at new ways of conveying learning content in the best possible way with GBL.

# Bettina North | Akademie für berufliche Bildung

GATE:VET Project Team

Germany | Dresden

Bettina North

Many years of experience in tertiary education have shown me that games are not only suitable to motivate younger learners. I have always tried to integrate little games and elements of play into my lessons to lighten the mood and break through what are often quite complex topics.

My interests are wide-ranging, but a particular focus has always been on translation processes - be it literal translation from one language to another, cultural translation or translating theory into practice (including the transfer of knowledge to students). Games can be a wonderful “language” to transmit knowledge - sometimes the acquisition of knowledge may even seem like a side effect.

I am currently working in the field of vocational education and training and am involved in several European projects, all aimed at adapting processes and content of teaching to the diverse challenges of our world.

# Stéphanie Philippe | Manzalab

Mobile Games as Support for Digital Design Students

GATE:VET Project Team

France | Paris

I hold a doctorate in biotechnology therapeutics and worked for a while in academia. Subsequently, in multiple start-ups and a consulting firm, I had the opportunity to collaborate on a European scale, coordinating international public and private partners around serious games, multimodality and different applications of innovative technologies.

Stéphanie Philippe

# Cornelia Schade | Technische Universität Dresden

How to Develop an Adaptive Learning Path for the Serious Game E.F.A.

Germany | Dresden

I am a research associate at the Center for Open Digital Innovation and Participation (CODIP) of Technical University Dresden. My research focus are media didactics, Game-Based Learning and serious games. I am passionate about accompanying the creative development process of digital Game-Based Learning applications from the initial game idea to the finished prototype. I regularly incorporate methods such as paper prototyping or Lego Serious Play. The passion began with the co-development of a small business game on the topic of project management for students during an activity as a student assistant. Also during the work at CODIP the connection to Game-Based Learning was always present. I am currently developing a game concept that teaches managers the duties of occupational health and safety in a playful way (project E.F.A.). In addition to the procedure for developing adaptive learning environments, I also research the development process of digital learning games and how this can be accompanied with creative methods in the sense of human-centered design.

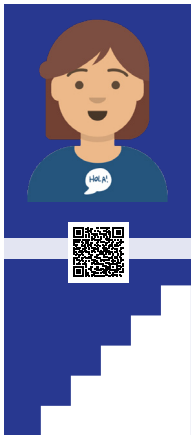
Cornelia Schade

# Valérie Radelet | Manzalab

Mobile Games as Support for Digital Design Students

GATE:VET Project Team

France | Paris



Valérie Radelet

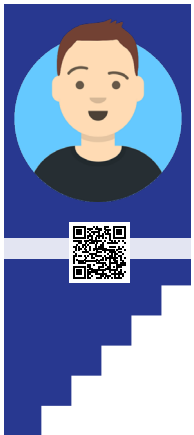
As the holder of a master's degree from ESC Rennes and an MBA from Wake Forest University - Babcock Graduate School of Management (USA), I worked for 15 years at Ubisoft Entertainment, first as a video game project manager, then as a manager of the *Development of Training Contents* department of the publisher. I have initiated many projects in all kinds of media.

In 2011, I joined Manzalab as a project manager, then a production manager. As such, I was one of the very first Manzalab employees. I am now Director of Customer Relations.

# Vincent Schiller | Fachhochschule Dresden

ENC#YPTED: An Educational Game for Programming in the Unity Engine

Germany | Dresden




During my media informatics and design studies, I had my first contact with GBL when we used the game SQL Island to understand database queries. The game remained in my mind due to its entertaining learning experience, which is why I decided to develop a GBL application as part of my bachelor's thesis, which would have helped me a lot when I started programming myself.

My main research interests today are still focused on easy onboarding of students to programming languages/tools as well as enhancing the user experience in multi user scenarios in mixed reality (VR & AR) worlds.

At the *New Work Design Lab* of the FHD, for example, we are currently working on a sandbox-like development kit, which can be used to create multi-user scenarios in VR within a very short time. This is used both by students to create games but also in our current research projects like a training app for exploring complex cause-effect relationships in industrial machines.

# Maria Storm-Holm | VUC Storstrøm

GATE:VET Project Team

Denmark | Nykøbing Falster

Maria Storm-Holm

As a learning consultant and project manager, and having worked as a teacher for 16 years I find it interesting and mandatory to develop and improve pedagogical and didactic practice to improve students' learning outcomes.
Currently, I am involved in the Erasmus+ projects GATE:VET and GBT (Games in Basic Skills Teaching). I also manage an O&SR (Onboarding and Student Retention) Erasmus+ project and am actively developing our hybrid school at VUC Storstrøm.

# Yann Tambellini | Creasup Digital

Mobile Games as Support for Digital Design Students

France | Tonnerre

Yann Tambellini

Graduated from Rubika Supinfocom in 2001, I quickly started my career in the video game industry as a 3d Artist at 4x Technology. At the end of 2002, I co-founded the video game studio Kylotonn in Paris, holding the positions of Production Director and Creative Director. While working on more than 30 PC and console titles of a wide variety of styles, I became very interested in training, as recruitment difficulties were so great. I collaborate with prestigious institutions and universities.

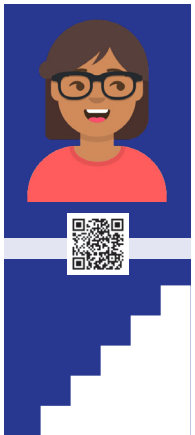
In 2012, I moved to China and worked mainly for Disney on many mobile games. Five years later, back in France, I joined Manzalab, a company specialised in Serious Games and Virtual Reality, to take over the production teams. At the same time, I began to set up CRÉASUP Digital with the support of the public authorities. Game is central to the school, both as a subject matter and learning method.

# Jazmin Zaraik | Manzalab

GATE:VET Project Team

France | Paris

After obtaining a Bachelor of Art in Cinema, where I devoted myself fully to my passion for motion pictures, I continued my training with a master's degree in Production Management. After different experiences in film and animation, I joined Manzalab to coordinate international projects in serious games and educational applications.



Jazmin Zaraik

# Theresia Zimmermann | Technische Universität Dresden

Narration Design in Educational Games

Germany | Dresden

My interest in Game-Based Learning was sparked when I was doing my master's degree in Children's and Youth Media Studies. Eventually, as part of my master's thesis, I developed an educational game for children with the goal of providing information about the deforestation of the Amazon rainforest.
Currently, I am interested in the research field of interactive storytelling, especially in connection with location-based narration.

Theresia Zimmermann

## WRIIE A NOIE

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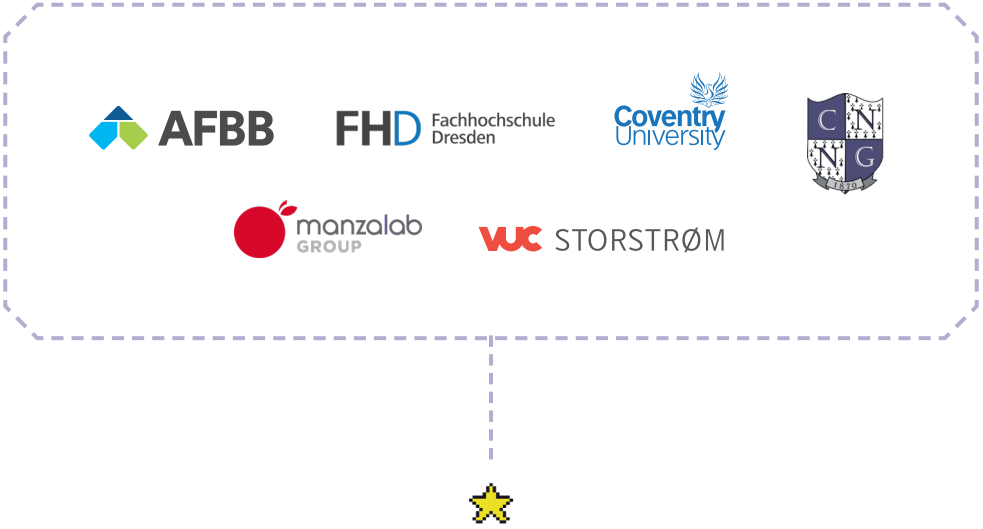
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As a teacher, you have probably heard of “Game-Based Learning” and “gamification” before and wondered: What is the difference between these terms? Why is it a good idea to engage students in learning with games? What do I need to know before I design and implement Game-Based Learning in my class? And how beneficial is it really to the learning process? If you want to explore some answers to these questions, we would like to embark on this journey with you. In this book, international education professionals and practitioners share their expertise in the application of Game-Based Learning principles. Educational researchers and game designers introduce concepts, trends and effects of Game-Based Learning as well as provide their perspectives on the topic. In addition to the theoretical background, you will find practical examples and recources that will enrich your teaching.

This handbook was created by the GATE:VET project team to share all the insights gained and outcomes achieved during the Erasmus+ funded project GATE:VET.