Design thinking and game-based learning: An expert talk

Please tell me a little bit more about yourself and your background.

Of course. I am a professor of games and learning at Aalborg University in Copenhagen. Our research focuses on games and learning in various ways and contexts, primarily in primary and secondary schools. Although we mostly concentrate on digital games, we also explore board games and role-playing games. Recently, I received a grant for a project on E-Sports targeting young people with autism disorders, which is a completely different story. I am also concluding a fairly large project called GBL 21 – Game-Based Learning in the 21st Century. This project revolves around design thinking and games in different school subjects.

My work typically involves design interventions, wherein we develop innovative teaching and learning methods using games. We then test these methods with practitioners, primarily teachers. At times, we collaborate with companies if it is beneficial. I am not only interested in the design process but also in the dialogue and reflection surrounding it. In educational contexts, I am particularly intrigued by the feedback received during design processes.

Teachers are the gatekeepers and change agents. Without their support, progress is impossible. My primary focus lies in design approaches, dialogue, and teaching practices.

So how did you become interested in design thinking and game-based learning? Why those two topics?

Looking back, I believe my interest began when I read about a school in New York called Quest to Learn. I visited the school around seven or eight years ago and was highly impressed with how they integrated design thinking and games into their curriculum and daily practices. They even had a board game designer working at the school, which is a public school in Chelsea, Manhattan. The idea of allowing kids to address significant challenges using game tools, game framings, and sometimes digital tools like Scratch or Minecraft, as well as analog tools like board games, truly resonated with me. These game elements were linked to the curriculum through an iterative design thinking process, which involved facing a challenge, brainstorming ideas, and creating a game to address and solve the challenge.

The school was founded by an NGO called Institute of Play, which no longer exists. However, many of their resources are freely available through the Connected Learning Alliance. I was fascinated by their work and decided to implement something similar in Denmark. This led to

the inception of the GBL 21 project, which received funding and involved 40 schools in Denmark – a large-scale project. Half of the participating schools were intervention schools, while the other half served as a control group.

I also started using design thinking in my own teaching, along with my colleagues. We received incredibly positive feedback from students when we adopted this hands-on approach to develop creative ideas. In my experience, design thinking is an extremely useful method that can be applied across primary school to higher education settings. It provides a valuable way to address complex problems, fostering innovative ideas and solutions to confront and challenge these issues. Consequently, as a university teacher, I became fascinated with this approach and incorporated it into my own teaching and various projects.

That's actually very interesting. I came across the Quest to Learn school a few years ago, and I had a look at what they're doing. It is really fascinating.

Yes, they work with both design thinking and games, as well as something called systems thinking. This approach makes perfect sense because games are systems, and many disciplines can be described as systems, such as languages or ecosystems within natural science. When you have a game that is a system and a topic that is a system, you can merge them to facilitate learning and teaching. For example, instead of Maths, they use the term "code worlds," which is a combination of language and Maths. They integrate different subjects this way.

It's important, however, to use this abstract method with moderation and with students who are capable of handling this approach. Design thinking is much easier to understand because it is hands-on and iterative, resulting in a tangible product.

There is a book about Quest to Learn, which outlines their founding ideas and showcases some of the curriculum and original concepts developed by the people who created the school in the first place.

As for the impact of their approach, they have some test results from the school. While they don't perform better in traditional subject measurements, they do quite well in another test called the College and Work Readiness Assessment, developed by Stanford. This test measures critical thinking skills, and their students' success in this test is attributed to their engagement in design thinking, reflection on the design process, and deeper involvement. This, in turn, helps them develop a more profound understanding of how to address complex problems. It's one of the scientific proofs supporting the effectiveness of this approach.

So would you say that the biggest potential of design thinking is the fact that you actually reflect on what you're doing and that you learn to solve problems?

That's a big question. Firstly, it's important to understand that design thinking for professional designers is quite different from design thinking in schools. Children are not professional designers, and they work with a simplified version that doesn't fully encompass the understanding of problem-solving, clients, and being a professional designer.

My colleagues conducted a review titled "When Design Thinking Goes to School," which looks at the research on using design thinking in K-12 school systems. They identified different competencies, with reasoning and critical thinking being among them. However, students can also learn other skills such as developing new ideas, collaborating, understanding problems, modeling, sketching, building prototypes, and comprehending the design process, which is quite different from most school activities.

In the large project I am managing, we tried to measure some of these competencies using an advanced, scenario-based test model that featured complex problems. Unfortunately, the COVID-19 pandemic disrupted our project, and we couldn't measure the effect from the test. Shifting such a project online isn't feasible, and I believe a lot of education became more traditional during the pandemic.

Critical thinking is indeed a significant aspect of design thinking, but it depends on the teacher's ability to drive critical discussions and conversations. This doesn't come naturally, as students are often inclined to focus on building and making things look nice. The goal of design thinking is not to create beautiful things but to quickly develop prototypes, communicate ideas, receive feedback, and revise accordingly. Developing critical thinking is possible, but it requires a teacher who can effectively facilitate the process.

So, it basically needs guidance and somebody who structures the process.

Yes, it's very holistic and open-ended, but it's also a really efficient way of going through a complex design process where you have to make decisions, converge on ideas, and communicate them.

So a lot of people are talking about gamification or serious games, but they never talk about game based learning. Why do you think that game-based learning is probably the better approach?

There are many different interpretations of these terms. At Quest2Learn, they have a nice way of putting it in their book. They discuss gamification as using game elements in a non-game context, such as badges, points, and progression bars. This approach often becomes behavioristic and simplified. Game-based learning, on the other hand, involves working with actual games. These can be learning games, commercial computer games, or even commercial board games. Quest2Learn also talks about "game-like learning," which frames teaching as an open-ended, playful investigation without necessarily using game mechanics.

I must say that much of the mainstream literature on game-based learning, which has increased significantly in the last 10 years, is focused on learning games with narrow educational aims. This research often seeks to measure the effects of such games on specific learning outcomes. However, my work takes a broader, more holistic approach, focusing on developing a wide range of competencies, fostering social relations between students, and promoting creativity, dialogue, and reflection.

In Scandinavia, many researchers in this field share my perspective, but worldwide, research on gamification and game-based learning can be narrowly defined. While there are some excellent learning games available, for every good learning game, there are 10 bad ones. Minecraft Education and Scratch are two examples of effective learning games that emphasize creativity and design.

In our project, we aimed to work with games for learning in a design-oriented, design thinking fashion within the constraints of traditional subjects. We wanted to see if we could change the school and teaching culture through this approach. We found that using game templates allowed students to redesign and adapt games more easily, making it more feasible to incorporate game-based learning into the curriculum. However, some teachers were more receptive to this approach than others.

Well, that’s it, isn’t it? It all comes down to authenticity. If you're into games yourself, you will see the point, but if you have never played a game, you won't get it and think games are a waste of time. And they don't realize that you learn a lot of competencies and skills with that. So it is, as you said, more of a mindset.

Indeed, but I think it's also challenging for many people to understand that just as games are very different and have many different faces, like Monopoly versus Counterstrike, they can also be linked more effectively to certain subjects than others. Research suggests that foreign language teaching is the subject with the best results

when it comes to incorporating games. However, most teachers are interested in using games for math, where the results aren't as strong.

Playing a game is closely related to learning a language, as both involve making conversation. For example, my son is currently playing Minecraft with people from all over the world, learning English through gameplay. In contrast, the connection between math and games can often be superficial or misaligned. This complexity can be difficult for people to grasp unless they delve deeper into the relationship between games and learning.

Yeah, basically you would need a narrative that makes it necessary to integrate math into the game without saying it's math and you need to learn a certain type of math, but it should be logical to use it in that game. It's funny, I actually don't use Minecraft, I use Minetest, which is an open-source game engine. In my day job, I am the project manager of BLOCKALOT, a website that allows teachers to create virtual worlds at the click of a button. Because we don't want them to have to host their own servers. It's just way too hard. So we have this platform and we also have a lot of pedagogical support, a support system and a networking system. And we realized that basically it's very hard for teachers to realize how important the narrative is, and that even kids who are 16 will not laugh at them if they have a good narrative because they will actually get right into it and they will forget that they're learning. They'll just play and they will still learn. So again, it’s a question of mindset to actually see that storytelling is something that connects all ages.

I think one of the strongest arguments for motivating and engaging children through games, especially for those who are fed up with school or have a hard time in school, lies in the power of narratives. There is substantial evidence pointing in that direction, and that's also something I'm working on – games and inclusion and collaboration through games, and tapping into the social element and community learning that comes from gameplay. The relations between students and students, and the teacher through games, are actually some of the main reasons to use games.

However, if you look into the research, this aspect is often overlooked because the focus tends to be on designing and testing for specific narrow skills, and it's difficult to measure collaboration. I think the same goes for design thinking, where you work in groups on designing solutions and then present your prototype and get feedback. There's a lot of learning happening within those groups, as students have to negotiate, agree, and let go of their ideas. It can be frustrating to go through that process, but it is highly educational to have that experience, even if it can be quite frustrating at times.

Definitely. So if we suppose that schools are to make young people capable of shaping the future, so their goal is future-oriented learning. Do you think that the combination of design thinking and game-based learning can contribute to that? That it actually provides them with the competencies they will need one day to shape the future, which is also our future? Similar to the OECD Learning 2030 framework, for example, which really puts agency at the center of everything.

I think that design thinking can contribute to it by having learners envision future scenarios and possible outcomes. Design processes and games have something strongly in common in that both address a challenge and require coming up with ideas to address that challenge. Playing a game and designing something both focus on addressing challenges. However, games for learning can be many different things, and you could also use games in learning more conservatively.

I think there is potential for helping students develop future-oriented thinking, where they learn that solving a challenge requires multiple iterations and the development of habits of mind to address complex problems. They also learn to understand that they can create their own solutions to these problems and realize they have agency in that process, just like they do at the Quest2Learn school and in our project.

For example, one of the units from our project has students address issues with toxic communication online. They have to develop a board game about addressing online toxic communication. They start by doing research, looking into the communication of influencers on YouTube and TikTok. They use the information they find to create a board game prototype that addresses toxic language online. Then they experiment with different game designs, try each other's games, and give feedback. These were fifth graders, and some teachers would say students don't need to learn about online communication, but this is the reality they know.

At another school, seventh graders who came from different schools and didn't know each other had conflicts with each other. They couldn't do this exercise because it required trust and confidence to discuss issues and problems with toxic language online. If you don't know the people around you when you're doing this exercise, it's tough because you don’t have shared ground, and it's a sensitive topic.

I think one of the key findings is that you need to create design challenges that are meaningful and interesting to students. This can be challenging because it comes with a paradox: as a teacher, you have to give them a dilemma that becomes their dilemma. How can you do that? How can you provide a challenge that is not just something you have decided is a challenge but something they will adopt and feel connected to?

It's like John Dewey said – you solve problems through inquiry processes, and it has to be important and relevant. It's not only a cognitive process; it's very much about empathy. You have to empathize with the problem and those who experience it to solve and address that problem. I think one of the key aspects of success with design thinking and helping students address challenges is this kind of empathy, which is very different from how teaching often occurs in school.

Yeah, I think if something's relevant to you, you will invest yourself. And if it's not relevant, you won't.

Indeed. Creating relevance can be challenging in a school context, because often the receiver of what you're doing is the teacher. So, the question is how you can create something that interests not only you but also your classmates, parents, someone at a neighboring school or class, or someone else in the community. When you create something that relates to them and receive feedback from them, it helps students understand that they can develop agency and make a difference at some point in their lives.

Of course, you shouldn't put too much responsibility on the students, causing them to develop apathy for climate challenges or other issues. However, I think the empathizing aspect is crucial.

Let's say you have the possibility to not only think outside the box, but really ignore that box that is the system. What do you think we could do with design thinking and game-based learning if the system didn’t keep us prisoner?

That's a big question, right? You could never completely get rid of the system because if there is no structure, then I think everything would fall apart. I also think that it can sometimes be quite demanding for students to work with design thinking. They need some kind of skills to engage in these processes at some point.

I know there are some very progressive schools in Denmark, and some of them were part of our project. They have been working with these things for many years, and what they were saying was that you need to have periods where things are quite stable and regulated in school. Otherwise, you might lose some of the children because it becomes too demanding for them. That's not to say you're doing boring teaching or only skill-and-drill, but you need to have some kind of variation between more open design processes and other methods. For some of the low-performing students, it could actually be quite challenging. They could feel lost in these processes because sometimes it is quite demanding for them to be there, so they also need some structure and other activities.

So, I think there's a dilemma here. If you are doing open-ended creative processes all the time, you could actually end up with a less inclusive school. But I know there are many different perspectives on this, so you don't have to agree. I think the devil is in the detail; it depends on how you're actually doing it.

I agree that it is also a lot of work for teachers to constantly do this.

Yes, it is very demanding for teachers, and it's far easier for teachers to do more skill-and-drill. So, I think we should acknowledge that. It's definitely not for all teachers and for all children. If we want to create solutions that could be used in all schools, which was my goal with this, we definitely need to think about the balance between how often we do these open-ended processes, how we structure them, and how we link them with the school system. That's pretty tricky.

In our project, some teachers put all the units in a row, and it really didn't work because it just became too much, and the kids ended up saying they didn't like it anymore.

What if we had a different system that really was different from the start, that didn't train kids to give up their creativity, expect certain things from school, like grading, having to go through standardized testing, trying to make everyone the same. Do you think that would make it easier for kids to find orientation without really clear-cut structures?

Of course, and I think, unfortunately, in Denmark things have been moving lately a bit in the wrong direction because we have now had these kinds of national tests that are mainly used for administrative purposes. Very few researchers, teachers, students in this country regard them as a good idea, but for some reason politicians have succeeded in implementing them as a mandatory thing in schools and it's very strange that they succeeded in doing that.

I definitely think that we could have an educational system that could benefit far more from doing these more design thinking-oriented and game-based-learning-oriented activities in a more progressive and competence oriented way and not focus so much on kind of basic skills and knowledge that is still there and in that sense also promote more risk taking and more creativity and this kind of more open mindset, which this is really all about being sort of developing these kind of habits of mind for addressing complex issues and using your imagination to doing so and envisioning different possible outcomes of different scenarios.

So yes, I think that that kind of thinking could be promoted far more than it is today and so I'm definitely on that track. I'm just saying that you can’t do it like 100% all the time because I

haven't seen one example of where that worked, and I think even if you go to Quest2Learn, you will also see that they also have, you know, spelling, basic math, etc. There are some things that you need to go through even though they are tedious and that you need to learn at some point, but I think the balance could definitely be moved towards a more progressive education.

I think we got pretty good feedback from, especially from the students in our project. And especially when not doing it all the time for like a month on end. So that's also an important finding for my project, actually.

I think you're absolutely right when it comes to the current system, but I also sometimes wonder, like, yes, of course you need to learn spelling and you need to know arithmetic and all that. I may be an idealist, but I sometimes think that what if you have a third-grader who actually wants to learn spelling or math because they need it to solve a problem relevant to them. Like they really want to solve a certain problem and they need to learn to read.

I know that's not going to happen in my lifetime, but my hope would be that you could actually, you know, combine a set of different methods like design thinking, like game-based learning and other things, and create a different kind of atmosphere for learning.

I agree totally with you, and I think there's a huge need for that. And I definitely think we should have maybe not a complete revolution, but a modest revolution of the educational system and there is definitely a lot of need for thinking new ways of teaching that tap into the imagination. I think that is one of the most incredible aspects of human beings that they have this imagination, right? And I don't think we are using it sufficiently in schools and this is what designing games is really about. It's about coming up with the ideas and imagining different outcomes and trying them out and seeing what happens and this kind of approach to learning has a lot of promise, I think.

You know, in the 70s Denmark, we had a lot of progressive education, which was sort of without structure and became very political and very sort of chaotic and sometimes, and I think what is nice about design thinking and using games is it actually provides a lot of structure

Because, actually, in the design thinking framework, these are structured phases, right? There are certain rules so to speak, there's certain norms and how she should go about this. There's a product, there is a kind of thing you are producing. There's a focus, you know, and the same way with the game. Games are always very concrete. They may be very different, but they are always very concrete.

I think those are the things we should be looking into. What are the structures, the focus, the rules, the kind of engagement? I mean, these are kind of valuable constraints if you follow me. People sometimes call them enabling constraints and I think these kinds of enabling constraints are the basis also for creativity.

But at the same time, there are lots of constraints in the school system, far too many as it is now. So the idea is to reframe the constraints and sort of look at the school system as something like a poorly designed game in its current state. Because it's tedious, it's not clear what you're supposed to be doing. The roles are not clear. The challenges are abstract, vague, or outright boring, and there are not many different levels of participation, etc.

You know, it's easy to criticize schools, but I think you could redesign the constraints, and take inspiration from, you know, design thinking and game elements. Of course it will never be just like play at home, it will never be just like a game. I actually think that it would be naive and outright dangerous to think that school is like play or like a game completely because it's never going to happen. It's not supposed to. And it would be completely wrong to believe so. But I think if you do it wisely, like the Institute of Play did with Quest2Learn, that learning in school kind of feels like play, it would be a good idea.

Exactly, as you said, it's a question of design. Yes, we do need structure, but good games are so great in providing a structure, in providing rules, in providing challenges and also feedback, but the determining factor is that in a good game you do have self-determination and self-efficacy, agency and that’s something you don't have in school, where everything is organized by someone else and doesn’t make sense.

Agency is definitely the keyword here and providing students with more agency. And that's what games are doing. I clearly agree with you that that is extremely important. But then it's often down to very practical constraints about how you do that within a certain you know time, schedule, curriculum, aims, goals, testing demands, et cetera. And also teachers that are not comfortable and don't know about these processes. They don't know about games they don't know about what, how to run the design thinking process because they never tried it before and it's something you have to go through yourself a number of times, otherwise you're not able to do it, I would say, so there are definitely some constraints in that sense.

But yes, it's is doable, it is possible.

What would you suggest teachers who are afraid of losing control or losing face by doing things differently do to take some first steps in the right direction?

I think one of the teachers in my project had a nice phrase, she said “You have to put on the children's glasses, see the world through their eyes.” I think that was really a nice way of putting it that you have to observe how are they experiencing the science challenge, how are they experiencing a game?

So it's not just about design or game, it's about how they experience that and sort of scaffolding and designing their experience. You can only do this by putting yourself in their shoes. This is how it will become meaningful and interesting for them.

In one of my papers, I write about two different teachers that teach the same Scratch units in math. One teacher he just lectures to children 30 minutes and he's really an expert programming guy, you know, and they just became so bored they completely lost interest in programming and Scratch because they had to just listen for 30 minutes straight, and he didn't include them in the conversation at all. So when they had to do the hands-on exercises, they just didn’t know what to do and they just lost it

The other teacher, she didn’t know much about programming. She was very insecure, but she just said, let's start exploring this, let's go into this, see what it takes to create these tangrams in Scratch, and then all these questions emerged in the classroom.

- What is happening now?
- What are you doing now?
- What do you think is happening?

And she was learning together with the kids and then they found out together what it takes to do these math exercises in Scratch. And I have a paper that is about that and the kind of dialogue and how she facilitated that even. Though she clearly was insecure about it and she was just like let's go out and see what happens here. And I think you have to have that element of risk-taking as a teacher if you want to go this way. And that is a mindset for the teacher, this kind of risk-taking, to be willing to do that and taking children's experiences seriously in that process. Of course, not only doing that, but, but really incorporating them into it. The conversation is key to succeeding, without it we will lose.

So you're basically saying the human factor is what is most important and communication and doing actually why we wanted to become teachers in the first place, right? If you see yourself more as a learning partner and have this hope of really changing something for the future, I think that's exactly what you're referring to when you say it's seeing it from their perspective and then helping them reinterpret it, maybe through the lens of somebody who has a little bit more experience. But basically it's the human factor that changes everything.

Yes, I view it from a kind of a dialogic theory perspective, and it's about creating a dialogic space where you don't know exactly where you are going. Maybe you have an idea where you're going, but you don't know where you're going to end up. And that is the basic premise for life education, for learning. If you accept that premise, then you are better suited for having conversations with children and engaging them in these kinds of processes.

So I think that design thinking and this kind of progressive game-based learning will only work if it is based on this kind of premise. Because, I think, we also saw many examples of teachers working against the design thinking approach. You have to be able to let go in some ways, to follow along and see what happens when you are engaging in this, but then you have to ask critical questions and doing reflection and feedback along the way. So it's a very different teacher role. It's a facilitator. And I think that you have to allow children to have these kinds of hands-on experiences, and then you start the dialogue around that.

That's something that we learned the hard way in our project, I think. That and that many teachers may be experts in, you know, programming games, their subject, but if you don't have this approach to teaching where you are actually inviting students into the conversation in this way, then it's not going to work very well.

So it's not just about design, it's also about dialogue.

I completely agree. But at the same time, it’s exhausting for some teachers to change their practices because it is a lot of work and sometimes feels overwhelming.

Yeah, but at the same time, what many don’t see is that design thinking and games provide structure and structure is something that helps the teacher as well. Also, it's concrete, there are rules, there are different phases, there are specific concrete challenges. So there's also something for the teacher to lean on, it's not chaos in that sense. And I think that opening up people's eyes to seeing that in a progressive education there are actually ways of structuring design spaces, dialogic spaces, that there are ways of navigating that space where you don't necessarily have to invest yourself completely all the time,

So I think that some of these approaches and tools and methods we’re talking about here, they can actually help the teacher a lot but they need to become familiar with them at some point. So what I will be working on in the future are also board games. Because that's actually something that is used a lot by teachers and there is relatively limited research on it and it’s something that can be easily redesigned and then you can use makerspaces to build the game.

So the idea is also to repurpose the makerspaces that start collecting dust. Because it was a new investment and they're not being used anymore. So if you are working with board games it is something that is tangible and understandable and then you add on this kind of redesigning process.

Yeah, that makes a lot of sense. We have a lot of makerspaces here as well, but I sometimes feel like they aren't used properly. The people in charge sometimes don't seem to realize that making is actually a clear-cut pedagogical concept that goes beyond just making technology available to everyone.

Yes, you need a purpose, right? And I think the great thing about board games is that everybody knows what a board game is at some level. And then you can create board games that address complex challenges, right? So it's about making sense of climate change, try to solve it, you know, or about inclusion or multicultural discussions in your society or whatever. I think it's about finding these ways of building something or around something that is in the culture already.

Yeah, that sounds very interesting. Do you have any last words concerning design thinking and game-based learning?

I think that it's important when you work with these approaches that you try to balance the complexity so that there is a meaningful link between the game, the design process, and the subject aims if you want to do that, if you want to try that combination, which is what I tried to do in my research project.

And sometimes it's a good idea to work with more simple game design, so templates that you can redesign and mod in different ways than going for the complex game design that teachers and students will get lost in.

So I think that that is a key take-away. I think it is possible to strike that balance and we did that in our project and we are giving out teaching materials for free in a few months.

So I hope maybe people feel more inspired to go out and do that because it definitely motivates students and makes it meaningful for them to address challenges through game designs. And when they have concrete designs they can communicate, use them to communicate their ideas and get feedback on them. And they get very proud about their designs and they would love to present and talk about them and spread them in the world at some point.

Thank you very much for the interview. It was a pleasure talking to you.

You're welcome. Likewise.

Recommended Reading

- We have to talk together. Addressing communicative challenges among amateur esports players
- Videogames in and beyond the L1 classroom. Gaming literacies and implications for practice.
- Teachers' framing and dialogic facilitation of Minecraft in the L1 classroom.
- Developing design principles for game-related design thinking activities
- Design thinking, game design and school subjects. What is the connection?
- When design thinking goes to school: A literature review of design competences for the K-12 level
- Disruptive Fixation

Links

- GBL21
- Quest to learn
- Quest to learn (MITPress)
- Quest to learn (Research)