

# GBL 21



# GAME-BASED LEARNING IN THE 21ST CENTURY

SPILBASERET LÆRING I DET 21. ÅRHUNDREDE



## RESEARCH QUESTIONS

The GBL21 project explores the following research questions:

• How can students' motivation and 21st century skills be developed through GBL in the subjects Danish, Math and Science in the 5th and 7th grade?

• How can this evidence be used to further develop GBL materials, design principles, and assessment tools that support 21st century skills?



## STATE OF THE ART

A recent review of GBL finds evidence that design-oriented approaches to games are the most effective in terms of developing 21st Century Skills, which is also the approach taken in our project (QIAN & CLARK, 2016). We understand GBL as relating to the process of designing games, exploring game worlds, and reflecting on game activities - through the use of both digital and analogue game tools within the subjects Danish, Math and Science.

Our design-oriented approach to GBL is inspired by the public school Quest 2 Learn (www.q2l.org), which was Co-founded by our project contributor Institute of Play. Students at this school become engaged in designing and exploring both analogue and digital game dynamics in learning environments, where "failure is re-framed as iteration" (SALEN ET AL., 2011)



Our approach to GBL is informed by Design Thinking, which implies an analytical and syncretical process where design methods are applied as strategies for innovation. In this way, our project aims to empower teachers with tool kits that support their creative abilities and provide a process that facilitates students' learning by fostering 21st Century Skills. This will promote subject-specific literacy practices, which move beyond the basic skill-oriented assignments that dominate Danish schools.

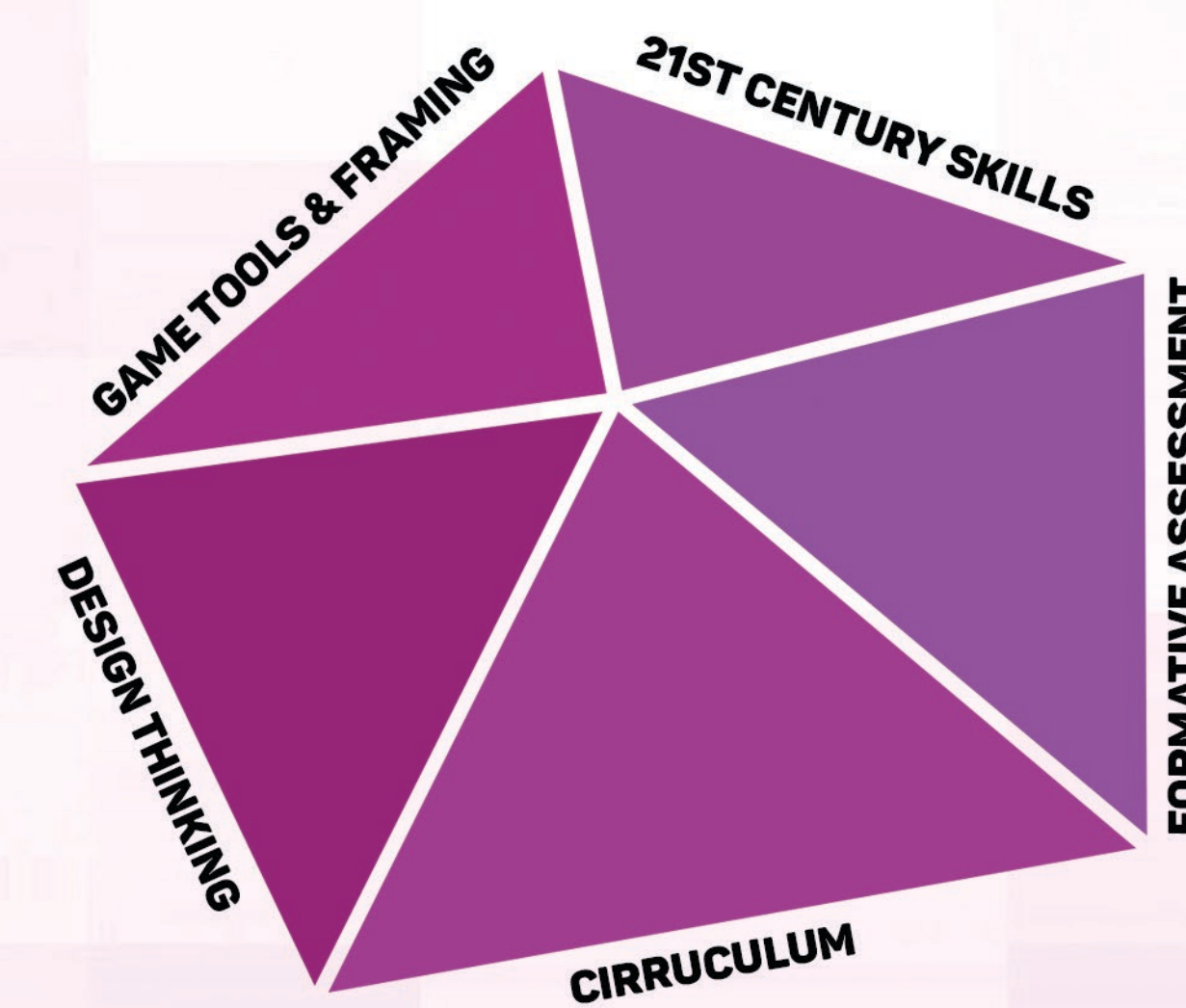
## PROJECT AIMS

Games are valuable tools for developing 21st Century Skills as they pose engaging and complex challenges, which provide a wealth of opportunities for fostering collaboration, communication, critical reasoning, problem-solving and digital literacy. By taking a design thinking approach to GBL, our project aims to empower teachers with tool kits that support their creative abilities and provide a process that facilitates students' learning by fostering 21st century skills and linking these to curricular aims. Furthermore, the project will develop a tool for formative assessment of 21st century skills.

It is a long-term objective of the project to inform curricular legislation regarding the aims of developing 21st Century Skills in the Danish school system. The project has the potential for setting a new political and pedagogical agenda in the Danish school system by demonstrating and highlighting that it is possible to teach, assess and promote students' 21st century skills in combination with their subject-specific learning, which will be highly important to the success of their future education and workplace experiences.

The GBL21 project is funded by an investment of 9,8 MDKK from the Innovation Fund Denmark.

## PROJECT ELEMENTS



Project goals are to:

- Show an increase in **students' 21st century skills, motivation and grades** with an expected effect size of 0.25.
- Support the development of **teacher skills** in teaching GBL, design thinking and 21st century competencies.
- **Develop resources** that can support teachers and teacher's teaching in 21st century skills through game-related methods.
- Raise **awareness among policy makers** about the importance of developing students' 21st century skills.

## RESEARCH METHODS

GBL21 is based on a design-based and multi-methodological approach to assessing 21st Century Skills. The main hypothesis is that students develop 21st century skills by participating in GBL-related design processes. This is studied in the 5th and 7th grades within the subjects Danish, Math and Science, and measured in a randomized controlled trial using an innovative assessment of 21st century skills. The project will be carried out at 20 schools across 5 municipalities.

The project design combines the methodological approach of design-based research with large-scale surveys, performance assessments and observations of the participating students' 21st century skills. The project progresses from a development phase with multiple iterations of tools for learning and assessment at 3 pilot schools to large-scale interventions at 20 schools.

The qualitative data collection will involve observations, interviews and collection of student assignments in order to describe and understand how teachers adapt the game-based learning resources and how students participate in learning activities and subject-specific literacy practices that develop 21st century skills. The collection of student assignments will allow comparison with other studies of student assignments.

## REFERENCES

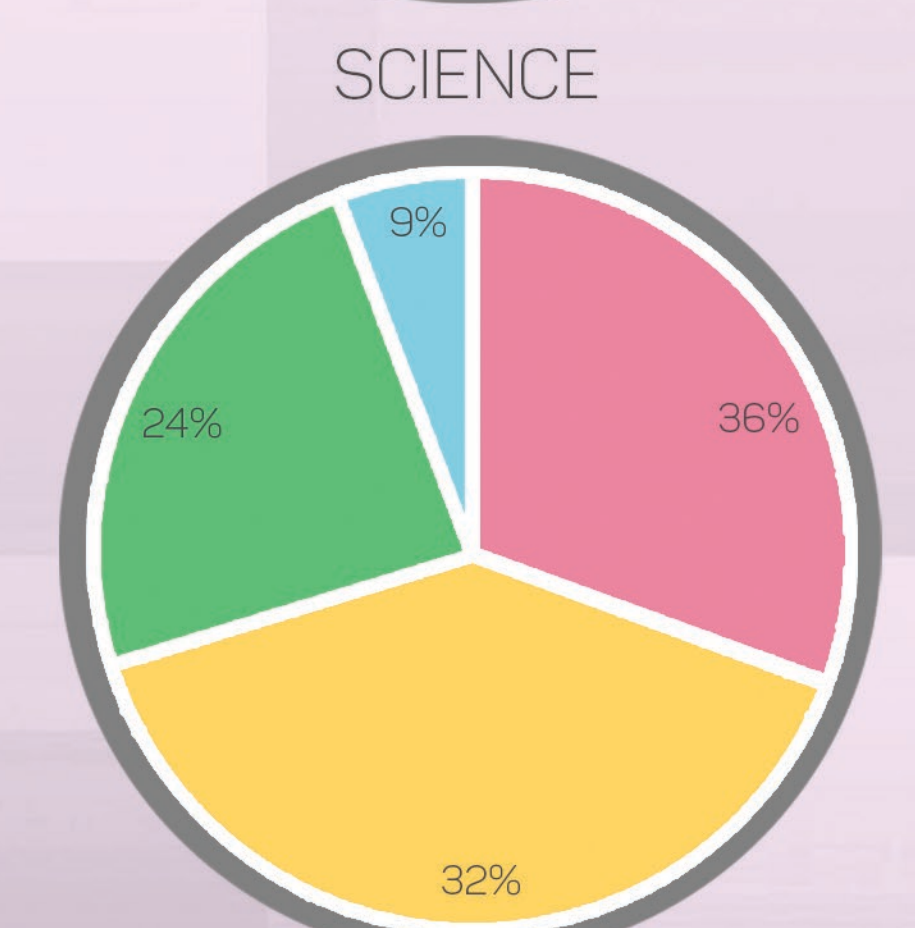
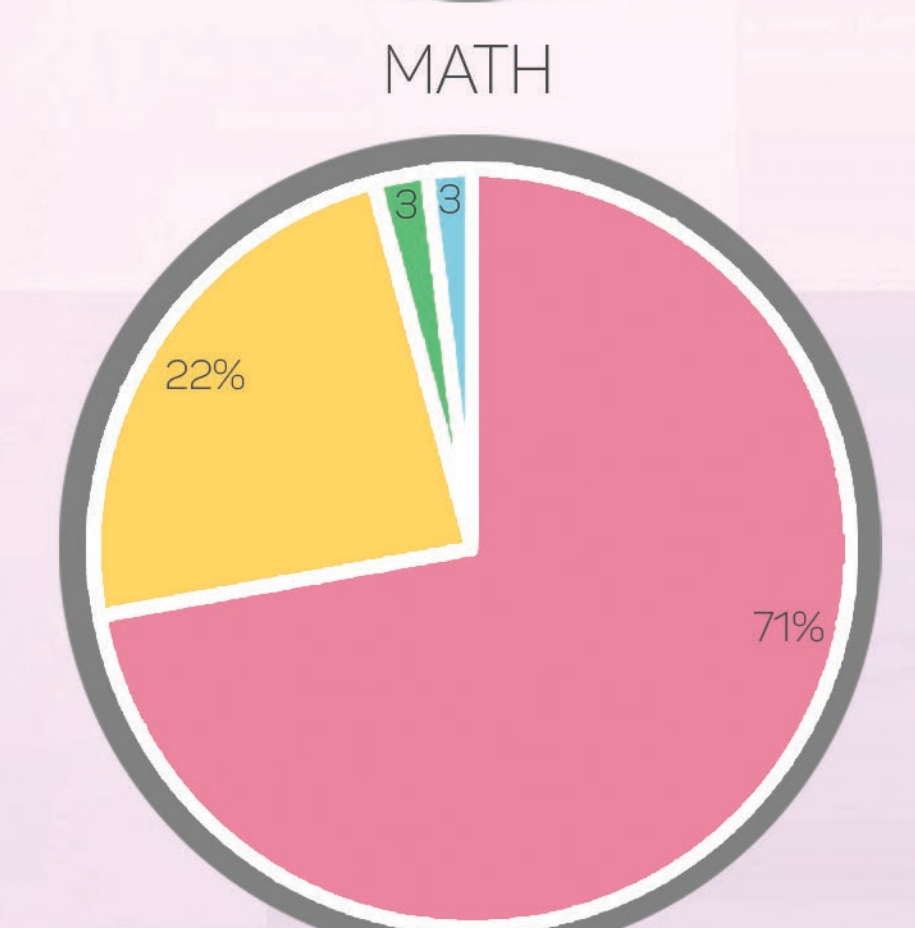
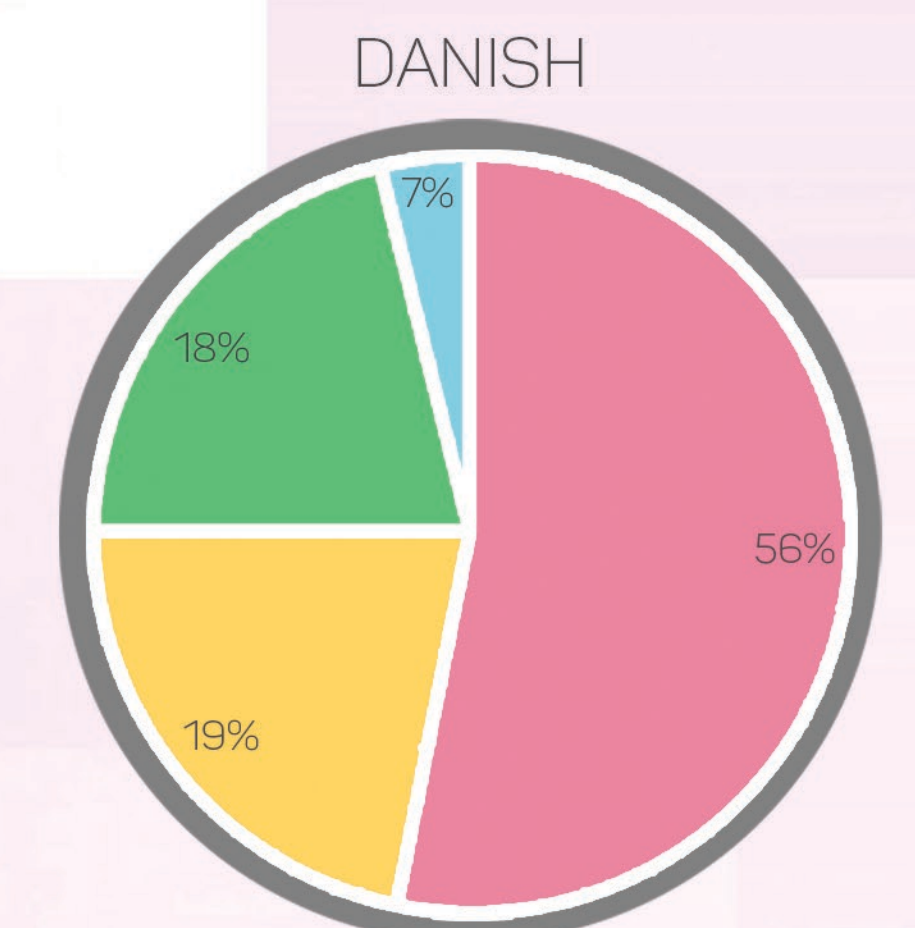
Bundsgaard, J., & Hansen, T. I. (2016). Blik på undervisning: Rapport om observationsstudier af undervisning gennemført i demonstrationsskoleforsøgene. Læremiddel.dk.

Qian, M., & Clark, K. R. (2016). Game-based Learning and 21st century skills: A review of recent research. Computers in Human Behavior, 63, 50-58.

Salen, K., Torres, R., Wolozin, L., Rufo-Tepper, R., & Shapir, A. (2011). Quest to Learn: Developing the school for digital kids. The MIT Press.

## STUDENT ASSIGNMENTS

The current status of teaching at Danish schools point to a need for developing students' 21st century skills. The diagrams show baseline observations of teachers' focus for student assignments in Science, Danish and Math. (BUNDSGAARD & HANSEN, 2016)



- NO ASSIGNMENT
- REAL-WORLD PROBLEMS
- TRAINING EXERCISES
- CONSTRUCTED PROBLEM TASKS

## PROJECT TIMELINE

2017-2022



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