



**Open Universiteit**

# Generative AI systems and Learning-Experience Design

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Source: Slidemodel.com





## SETTING THE SCENE

- Generative AI systems in a broader context
- Generative AI systems for learning and instruction
  - AI-plagiarism vs AI-powered learning and instruction
  - Crafting AI educational prompts
    - ✓ ***AI prompt is a design blueprint***
    - ✓ ***It should be based on learning science and research findings***
    - ✓ ***It needs to be tried out and improved***
- Educational design research and AI
- Group concept mapping and AI
- AI tools for research



## WHAT ARE THE AI SYSTEMS (LARGE LANGUAGE MODELS) - FEATURES

- Pre-trained on large amount of data to emulate the statistical structure of language that compute probabilities to predict the next word given a sequence of words
- Without any human-like comprehension
- Project human qualities like emotions and understanding onto machines that lack them (anthropomorphism)
- Produce unreliable or plausible but false information and output that is culturally and politically biased (confabulation/“hallucination”)

Explain what are text generators like GPT

Certainly! Text generators like GPT (Generative Pre-trained Transformer) are machine learning models designed to generate coherent and contextually relevant text based on a given input. Here's a breakdown of the key concepts:

1. **Generative Models:** These are a type of machine learning model that can generate new data samples that are similar to the input data. In the context of GPT, the data samples are sequences of text.
2. **Pre-trained:** Before being fine-tuned for specific tasks, models like GPT are pre-trained on vast amounts of text data. This helps the model learn grammar, facts about the world, reasoning abilities, and even some level of common sense. The pre-training phase involves predicting the next word in a sequence, which helps the model learn contextual

Send a message

ChatGPT may produce inaccurate information about people, places, or facts. [ChatGPT August 3 Version](#)

# ChatGPT Sprints to One Million Users

Time it took for selected online services to reach one million users

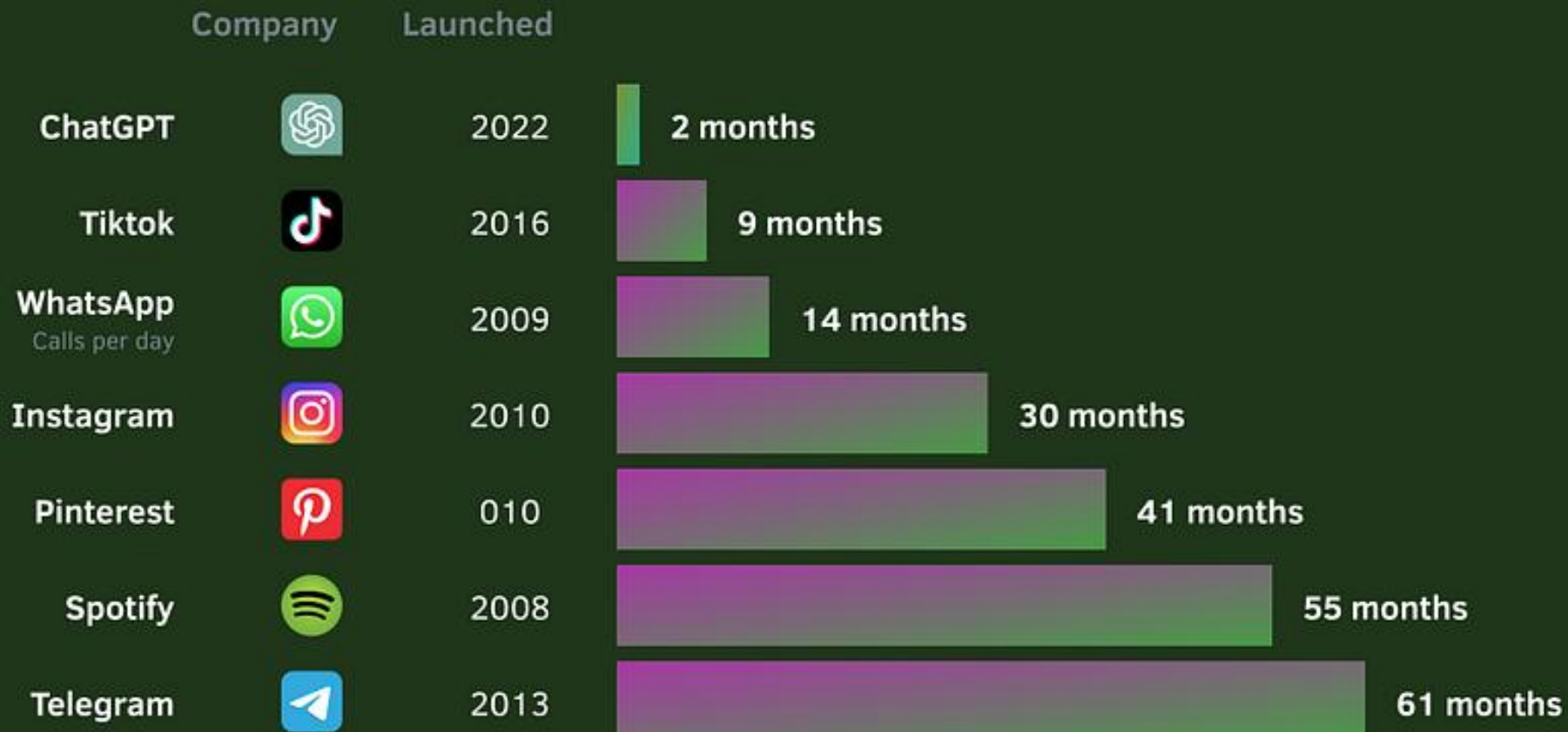


\* one million backers \*\* one million nights booked \*\*\* one million downloads

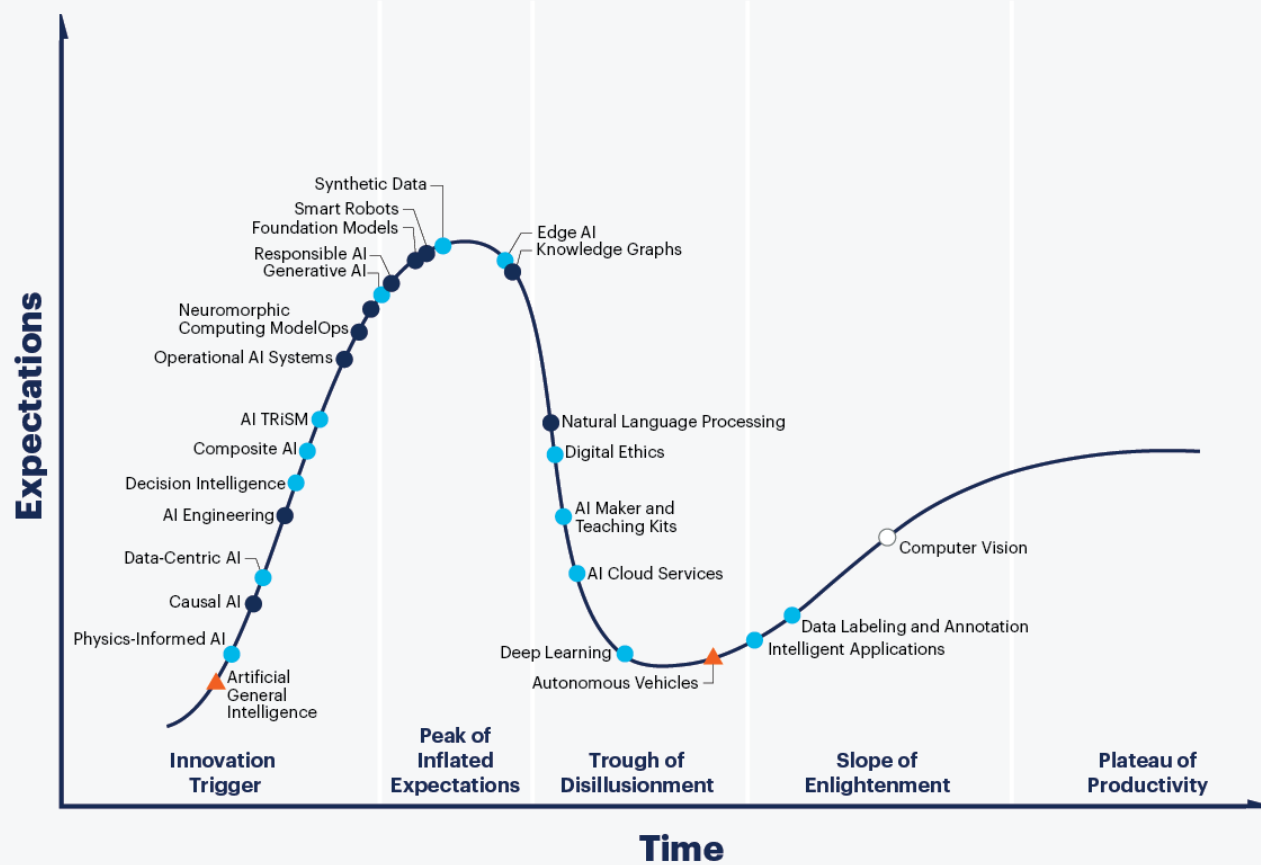
Source: Company announcements via Business Insider/LinkedIn



# HOW MUCH TIME IT TOOK TO REACH 100 MILLION USERS



# Hype Cycle for Artificial Intelligence, 2022



Plateau will be reached:

- less than 2 years
- 2 to 5 years
- 5 to 10 years
- ▲ more than 10 years
- ⊗ obsolete before plateau

As of July 2022

gartner.com

Source: Gartner  
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Gartner



## WHAT ARE THE BENEFITS AND PROSPECTS OF THE AI SYSTEMS

- Technology has always been an accelerator and an enabler. AI is no different, but it does present potential risks that have to be managed (Yong, 2023)
- AI and machine learning skills, compounded by skills such as analytical thinking, evidence-based argumentation, and communication skills, are predicted to be the most high-value (World Economic Forum's Future of Jobs Report 2023, cited in Hardman, 2023)
- The most likely future is one where generative AI is an integral part of the way we live and work
- Using generative AI (like ChatGPT) in business improves users' performance by 66%, averaged across 3 case studies. More complex tasks have bigger gains (Nielsen, 2023)

What are benefits of text generators like GPT

Text generators like GPT offer a range of benefits across various domains and applications. Here are some of the key benefits:

1. **Content Creation:** GPT and similar models can help in generating creative content such as stories, poems, and articles. They can assist writers in overcoming writer's block by suggesting content or completing prompts.
2. **Education and Tutoring:** These models can be used as educational tools, assisting students with homework, answering questions on various topics, and offering explanations for complex concepts.
3. **Coding and Development:** Developers can use these models to generate code snippets, assist in debugging, or offer programming suggestions.

Send a message

ChatGPT may produce inaccurate information about people, places, or facts. [ChatGPT August 3 Version](#)



## AI IN EDUCATION – FIRST REACTION

- Fear that AI generative systems will undermine the integrity of the existing systems for assessment (e.g., writing essays)
- Fear of so-called “hallucinations” (confabulation) and reliability of AI outcomes.
- Fear of the future: as an educator, what does the rise of AI mean for me and my career?

(Hardman, 2023)





## HOW TO DEAL WITH THE THREAT?

- Ignore it or ban it
  
- AI-detection software (e.g., GPTZero, Turnitin AI, Conch, Jenni)
  - No AI detection tool can conclusively prove that text was written by AI
  - These tools will produce false positives
  
- Handwritten essays
  
- Oral exams



## AI CREATES OPPORTUNITIES FOR LEARNING AND TEACHING

- What if instead of focusing on plagiarism, we focus on adapting and innovating our learning-experience design (LXD) for a post-AI world?
- AI – a catalyst for improving learning and teaching
- Students - highly competent and critical consumers of AI technologies
- AI tools take on a new role as a tool and source of information to be critiqued and explored alongside other



## AI AND ASSESSMENT/LEARNING OBJECTIVES

- Write Inquiry-based learning objectives (learners construct their own understanding through the process of investigation, analysis and interpretation)

# #1: Write Inquiry-Based Objectives

## Before

"You will understand & describe the process of photosynthesis."

LEARNERS RECALL,  
REGURGITATE + REFRAME  
INFORMATION

LEARNERS  
"CHEAT" USING  
CHATGPT

## After

"Using ChatGPT & other sources, you will investigate the process of photosynthesis."

LEARNERS USE CHATGPT TO  
LEARN IN THE PROCESS OF  
INQUIRY

LEARNERS RESEARCH,  
COMPARE, ANALYSE +  
EVALUATE INFORMATION



## AI AND ASSESSMENT/DESIGN A PROJECT

- Design a project for each Inquiry-Based Objective (choose a real-world scenario or project related to the objective which puts the project into a real-world context)

## #2: Design a Project for Each Objective

### Objective

"Using ChatGPT & other sources, you will investigate the process of photosynthesis."

### Project

*FRAME THE OBJECTIVE AS A PROBLEM TO BE SOLVED OR A CHALLENGE TO BE ADDRESSED*

"You have been hired by a local greenhouse to optimize their plants' growth. Investigate the process of photosynthesis & develop evidence-based recommendations to improve plant growth."

*CHOOSE A REAL-WORLD CONTEXT THAT WILL MAKE SENSE TO YOUR LEARNERS*





## AI AND ASSESSMENT/DESIGN A PROJECT

- Design Performance-Based Assessments for each project (e.g., not only knowledge acquisition but also skills development and methods demonstrated during the inquiry process; learners to demonstrate their competence)

# #3: Create Performance Assessments for Each Project

## Skills

*LEARNERS MUST USE CHATGPT + OTHER SOURCES TO GATHER + VALIDATE RELEVANT + RELIABLE INFORMATION ON PHOTOSYNTHESIS*

Assess the skills that learners need to demonstrate in the course of their project work. This includes the ability to use ChatGPT to explore & understand the topic.

## Knowledge

*LEARNERS MUST CORRECTLY DESCRIBE THE KEY STAGES, COMPONENTS + FUNCTIONS OF PHOTOSYNTHESIS*

Assess learners' conceptual knowledge & understanding of core concepts, processes etc. This includes identifying any misconceptions generated from ChatGPT "hallucinations".

## Process

*LEARNERS MUST ANALYZE THE INFORMATION GATHERED, IDENTIFY KEY FACTORS AFFECTING PLANT GROWTH, + DEVELOP WELL-REASONED RECOMMENDATIONS*

Assess the inquiry methods that learners need to demonstrate in the course of their project work. This includes the ability to both prompt and critique, compare & validate ChatGPT outputs.



# Craft Prompt Together.

July 3, 2023



Help me craft a really good prompt for ChatGPT.

First, ask me what I want to do. Pause and wait for my answer. Ask questions to clarify as needed.

Second, once you have the information suggest a prompt that include context, examples, and chain of thought prompting where the prompt goes step by step through the problem.

Third, show what your response as ChatGPT would be to the prompt.

Fourth, ask if the user has any suggestions and help them revise the prompt



Of course, I'm here to assist you! To start off, could you please tell me what you would like to accomplish with the prompt for ChatGPT? Be as specific as possible, including specific topics, themes, or tasks you have in mind?

[Continue this conversation](#)

## SUPPORT CRAFTING PROMPT FOR GPT

- <https://chat.openai.com/share/c1b9f609-e3ac-497a-bf77-a56e1bfd5fb6>



## PROMPT ENGINEERING IN EDUCATION (A TEMPLATE)

- Giving ChatGPT a Role  
(e.g., Role: You are an expert K12 science teacher who specialises in teaching climate change to ten-year-old).
- Give ChatGPT a Specific Task  
(e.g., Task: Your task is to write a lesson plan for a one-hour lesson on climate change for ten-year-old K12 students, using active learning pedagogy.“).
- Give ChatGPT Instructions  
(e.g., Instructions: This is a first draft. Keep the lesson plan as short as possible, using bullet points where possible. Present the lesson plan in a table format with the following columns: objective, resources, activity, and timeframe).

(Hardman, 2023)



# USING CHATGPT IN THE CLASSROOM

## The Ultimate Guide

FOR TEACHERS

*“This isn't about replacing the human touch in teaching—it's about giving you back the time to focus on what you love most about your job... Remember, ChatGPT is just a tool, and it's here to help you. So don't be afraid to play around with it, ask it ridiculous questions, push its limits. The more you use it, the more you'll discover how it can best support you in your unique teaching style and context.” (pp.73-74)*

### SUPPORT CRAFTING PROMPTS FOR GPT

- Using ChatGPT to create lesson plans
- Generate Quiz Questions and Fun Facts
- Maintaining engagement in the virtual classroom
- Personal Professional Development
- Brainstorming new teaching strategies
- ChatGPT for Remote Learning





## TUTORING PROMPTING - ELEMENTS

- Tell the AI who it is
- Tell the AI what you want it to do
- Give it step-by-step instruction
- Give it examples
- Add personalisation
- Include LXD guidelines/pedagogy
- Add your own constraints


(Molick, 2023)








## AI TUTOR: INSTRUCTIONS FOR STUDENTS


- You are responsible for your own work. The AI can “hallucinate” or make things up
- It’s not a person, but it can act like one
- The AI is unpredictable
- Ask for clear explanations
- Share what you understand and what you don’t understand
- It may react to your tone or style


 Hello there! I'm your AI-Tutor, a friendly learning companion designed to help you navigate and understand complex concepts. I'm thrilled to accompany you on this learning journey. Now, let's dive in! Could you please tell me which subject or topic you'd like to explore today?


 I'd like to learn about scaffolding in education

 Fantastic choice! Scaffolding in education is indeed a fascinating and crucial concept. Now, could you kindly tell me about your current learning level? Are you a high school student, a college student, or a professional?

 A college student

 Great! Now that I know you're a college student, I can better tailor our discussion to suit your educational level. Before we delve deeper, could you tell me what you already know about scaffolding in education? It's okay if you don't know much; I'm here to guide you!

 I know that it helps students learn

 That's a great starting point! You're right, scaffolding is an educational approach designed to promote learning.



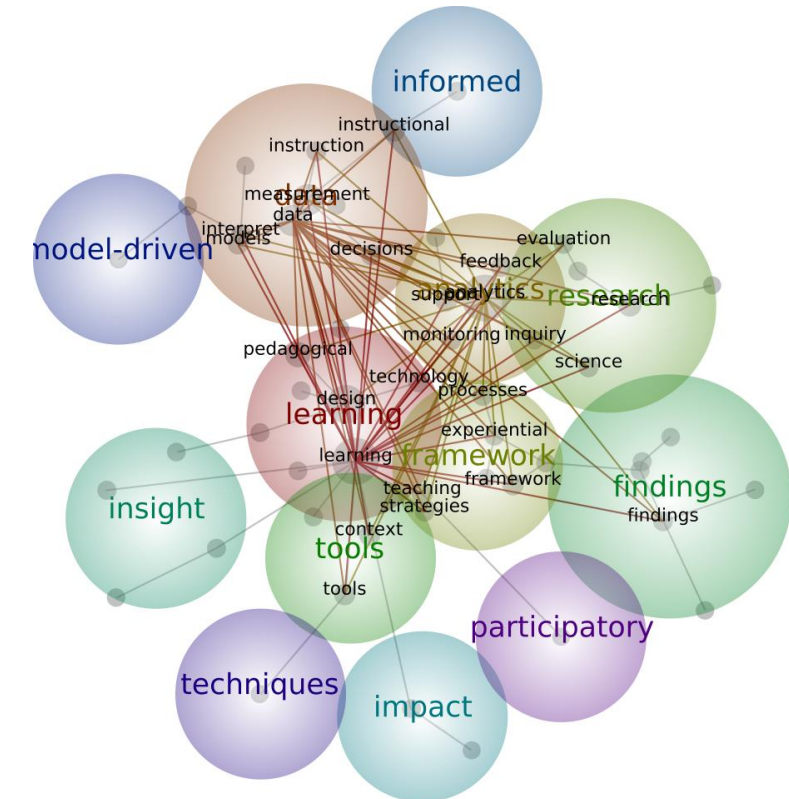
## AI PROMPT AND EVIDENCE-INFORMED LEARNING-EXPERIENCE DESIGN

- AI prompt is a design for learning blueprint
- It should be based on learning science and research findings
- Consider it as a prototype that needs to be tried out and improved



## AI PROMPT AND EVIDENCE-INFORMED LEARNING-EXPERIENCE DESIGN

- Effective learning strategies, e.g., space (distributed) practice, retrieval practice, interleaving (Donoghue & Hattie, 2021)
- Multimedia learning supported by the cognitive load theory (2010) & cognitive theory of multimedia learning (Mayer, 2014)
- The 2 Sigma approach for individual tutoring (Bloom, 1984)
- Holistic ID approaches: Elaboration theory (Reigeluth, 1983), Four Component Instructional Design model (Van Merriënboer & Kirschner, 2018), Cognitive Apprenticeship approach (Brown et al., 1996), Cognitive-Flexibility Theory (Spiro & Jehng, 1990), Problem-Based Learning (Hmelo-Silver, 2004), Epistemic Frames (Shaffer, 2005) and Instructional Design Model of Motivation (Keller, 1983).
- Effectiveness, efficiency, and enjoyability criteria



(Stoyanov & Kirschner, 2023)



## USING CHATGPT IN THE CLASSROOM: THE ULTIMATE GUIDE

### Here's an example:

Prompt: "Create a lesson plan for a 6th-grade science class on the topic of photosynthesis."

### ChatGPT Response:

1. Introduction: Brief discussion on plants and their need for sunlight.
2. Activity: Interactive video on the process of photosynthesis.
3. Discussion: How do plants use sunlight, water, and carbon dioxide?
4. Hands-on activity: Set up a simple experiment to observe photosynthesis using a water plant.
5. Homework: Worksheet on the stages of photosynthesis and their importance.

See? In just a few sentences, you've got a basic outline for your lesson. You can tweak it, expand on it, and make it your own. But the heavy lifting? That's been done for you.

## WWW.CHATGPTGUIDE.AI

- Using ChatGPT to create lesson plans



# Create a lesson plan for a 6th-grade science class on the topic of photosynthesis applying the following effective strategies: Distributed Practice and Practice Testing (ChatGPT)



Create a lesson plan for a 6th-grade science class on the topic of photosynthesis applying the following effective strategies: Distributed Practice and Practice Testing.



## Lesson Plan: Photosynthesis for 6th Grade Science Class

**Objective:** By the end of the lesson, students will be able to explain the process of photosynthesis, its importance, and the role of chlorophyll and sunlight in the process.

### Materials:

- Diagram of a plant cell highlighting chloroplasts
- Flashcards with key terms and definitions
- LED light, a plant, and a dark box or cupboard
- Worksheet with questions related to photosynthesis
- Quiz for practice testing

🔄 Regenerate

### Introduction (10 minutes):

1. Begin with a short story or anecdote about the importance of sunlight for life on Earth.
2. Show students a live plant and ask them how they think it gets its food.
3. Introduce the term "photosynthesis" and explain that it's the process plants use to make their own food using sunlight.

### Direct Instruction (15 minutes):

1. Show the diagram of a plant cell, pointing out the chloroplasts.
2. Explain the basic formula for photosynthesis:  
$$6\text{CO}_2 + 6\text{H}_2\text{O} + \text{light energy} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$$
3. Discuss the role of chlorophyll in capturing sunlight.
4. Emphasize the importance of photosynthesis in providing energy for almost all life on Earth.

### Distributed Practice (over several days):

Day 1:

- **Activity (15 minutes):** Set up an experiment where one plant is placed under an LED light and another is placed in a dark box or cupboard. Predict what will happen to each plant over a week.
- **Homework:** Give students flashcards with terms on one side (e.g., chlorophyll, carbon dioxide, glucose) and definitions on the other. Ask them to review these for 10 minutes each day.

Day 2:

- **Review (10 minutes):** Ask students to share their flashcard findings and clarify any misconceptions.
- **Activity (15 minutes):** Check on the plants from the previous day's experiment. Discuss observations.

Day 3:

- **Review (10 minutes):** Quick recap of the photosynthesis process.
- **Activity (15 minutes):** Students work in pairs to quiz each other using the flashcards.

Day 4:

- **Review (10 minutes):** Discuss the week-long plant experiment results.
- **Activity (15 minutes):** Distribute the worksheet with questions related to photosynthesis for students to complete.

### Practice Testing (Day 5):

1. **Quiz (20 minutes):** Start the class with a quiz on photosynthesis. This will include multiple-choice, true/false, and short answer questions.
2. **Review (10 minutes):** Go over the quiz answers, ensuring students understand any mistakes they made.
3. **Discussion (10 minutes):** Reflect on the week-long plant experiment and its connection to photosynthesis.

🔄 Regenerate

### Closure (5 minutes):

1. Reiterate the importance of photosynthesis for life on Earth.
2. Encourage students to notice the green plants around them and consider the incredible processes happening inside those plants.

**Assessment:** The worksheet and quiz will serve as formal assessments. Informal assessment will occur through class discussions, flashcard reviews, and the week-long plant experiment.

**Note:** The strategies of Distributed Practice and Practice Testing are integrated into this lesson plan. Distributed Practice is achieved by spreading the learning of photosynthesis over several days with repeated reviews using flashcards and activities. Practice Testing is incorporated through the use of flashcard quizzes, the worksheet, and the formal quiz at the end of the week.



# Create a lesson plan for a 6th-grade science class on the topic of photosynthesis applying the following effective strategies: Distributed Practice and Practice Testing (Bard)

Create a lesson plan for a 6th-grade science class on the topic of photosynthesis applying the following effective strategies: Distributed Practice and Practice Testing.

**Lesson Plan**

**Subject:** Science

**Grade Level:** 6th

**Topic:** Photosynthesis

**Learning Objectives:**

- Students will be able to explain the process of photosynthesis.
- Students will be able to list the three components necessary for photosynthesis to take place.
- Students will be able to list the products of photosynthesis.
- Students will be able to compare the leaves of a plant that has all the components needed for photosynthesis to one that has a component missing.

**Materials:**

- Pictures of plants
- Live plants
- Whiteboard or chart paper
- Markers
- Photosynthesis worksheets

**Procedure:**

- 1. Introduction:**
  - Begin by showing students pictures of plants. Ask them what they know about plants and how they get their food.
  - Write the word "photosynthesis" on the whiteboard or chart paper. Ask students what they know about photosynthesis.
  - Explain that photosynthesis is the process by which plants make their own food. It is a complex process that involves the sun's energy, water, and carbon dioxide.
- 2. Active Learning:**
  - Have students work in small groups to create a model of photosynthesis. They can use construction paper, crayons, or markers to create their models.
  - Once students have finished their models, have them share them with the class.

- 2. Active Learning:**
  - Have students work in small groups to create a model of photosynthesis. They can use construction paper, crayons, or markers to create their models.
  - Once students have finished their models, have them share them with the class.
  - Discuss the different models and how they represent the process of photosynthesis.
- 3. Distributed Practice:**
  - Give students a photosynthesis worksheet to complete. This will help them to review the key concepts of photosynthesis.
  - Have students complete the worksheet in small groups or individually.
  - Collect the worksheets and review them with the class.
- 4. Practice Testing:**
  - Give students a short quiz on photosynthesis. This will help them to assess their understanding of the topic.
  - Collect the quizzes and grade them.
  - Discuss the quiz with the class and address any areas of confusion.
- 5. Assessment:**
  - Observe students as they work on the activities and worksheets. This will help you to assess their understanding of photosynthesis.
  - Collect the models, worksheets, and quizzes to assess student learning.

**Differentiation:**

- For students who are struggling, provide them with additional support during the activities and worksheets. You may need to provide them with more scaffolding or break the activities down into smaller steps.
- For students who are ahead, challenge them with more complex activities. You may ask them to research the history of photosynthesis or to create a presentation on the topic.

**Extension:**

- Have students conduct an experiment to test the effects of different levels of light, water, and carbon dioxide on photosynthesis.
- Have students create a poster or presentation about photosynthesis.
- Have students write a poem or song about photosynthesis.



# Create a lesson plan for a 6th-grade science class on the topic of photosynthesis applying the following effective strategies: Distributed Practice and Practice Testing (Bing)

Create a lesson plan for a 6th-grade science class on the topic of photosynthesis applying the following effective strategies: Distributed Practice and Practice Testing.

- ✓ Zoeken naar 'photosynthesis definition'
- ✓ Zoeken naar 'photosynthesis process diagram'
- ✓ Zoeken naar 'photosynthesis quiz questions'
- ✓ Antwoorden voor u genereren...

Here is a possible lesson plan for a 6th-grade science class on the topic of photosynthesis, applying the strategies of distributed practice and practice testing:

- Objective: By the end of the lesson, students will be able to explain the process and importance of photosynthesis, identify the main components and products of photosynthesis, and answer quiz questions based on their understanding.
- Materials: Textbook, worksheets, flashcards, quiz sheets, pencils, markers, paper, scissors, glue, plant leaves, magnifying glasses, microscopes, slides.
- Procedure:
  - Introduction (10 minutes): Review the previous lesson on cellular respiration and how it relates to photosynthesis. Explain that photosynthesis is the process by which plants and some other organisms use light energy to make their own food from carbon dioxide and water. Show a video clip or an animation of photosynthesis <sup>1</sup> and ask students to pay attention to the main components and products of the process.
  - Guided Practice (15 minutes): Distribute worksheets with diagrams of photosynthesis and have students label the parts and write the chemical equation. Review the answers as a class and correct any misconceptions. Explain the roles of chlorophyll, light, water, carbon dioxide, oxygen, and glucose in photosynthesis. Emphasize that photosynthesis is essential for life on Earth because it provides oxygen and organic molecules for other organisms.
  - Independent Practice (20 minutes): Divide students into pairs or small groups and give each group a set of flashcards with terms and definitions related to photosynthesis. Have students quiz each other using the flashcards and check their answers using the textbook or the worksheet. Encourage students to use different strategies to memorize the information, such as repetition, mnemonics, or drawing. Have students switch groups after 10 minutes and repeat the activity with a different set of flashcards.

- Assessment (10 minutes): Distribute quiz sheets with multiple-choice and short-answer questions on photosynthesis. Have students complete the quiz individually and collect their answers. Review the correct answers as a class and provide feedback.
- Extension (15 minutes): Have students create their own models or posters of photosynthesis using paper, scissors, glue, markers, plant leaves, magnifying glasses, microscopes, slides, or any other available materials. Have students present their models or posters to the class and explain how they illustrate the process of photosynthesis. Display their work in the classroom or in the hallway.
- Evaluation: The lesson plan can be evaluated based on the following criteria:
  - The lesson plan aligns with the objective and covers the key concepts and skills related to photosynthesis.
  - The lesson plan incorporates distributed practice and practice testing as effective learning strategies to enhance students' retention and retrieval of information.
  - The lesson plan provides multiple opportunities for students to engage in active learning through various activities, such as labeling diagrams, quizzing each other, creating models or posters, and presenting their work.
  - The lesson plan includes formative and summative assessments to monitor students' progress and understanding of photosynthesis.
  - The lesson plan differentiates instruction by offering different levels of difficulty, support, and feedback for different learners.

I hope this lesson plan helps you teach your 6th-grade science class about photosynthesis. Is there anything else I can do for you?





# TeacherMatic: <https://teachermatic.com>

## Lesson Plan

Lesson Title:

Create a lesson plan for a 6th-grade science class on the topic of photosynthesis applying the following effective strategies:

e.g. Introduction to Artificial Intelligence

Length of lesson (Minutes):

60

Focus:

effective learning strategies x

Add further focus items above. Press enter to save after each item.

Learning Needs:

## Lesson Plan

Bloom's Taxonomy:

Knowledge  Comprehension  Application  
 Analysis  Synthesis  Evaluation

Result

Learning Objectives:

At the end of the lesson, students will be able to:

- Distinguish between the components of photosynthesis.
- Construct a model of photosynthesis.
- Assemble a detailed explanation of the photosynthesis process.
- Infer the importance of photosynthesis in the environment.
- Subdivide the components of photosynthesis.

## Lesson Plan

Introduction (5 minutes):

- Explain photosynthesis to students, emphasizing the importance of the process in the environment.
- Introduce the lesson objectives and explain the effective learning strategies to be used during the lesson.

Overview (5 minutes):

- Ask students to brainstorm what they know about photosynthesis.
- Ask students to list the components of photosynthesis.

Activity 1 (20 minutes):

- Divide students into small groups and assign each group one of the components of photosynthesis.
- Instruct students to use diagrams to illustrate the component they have been assigned.



Curipod: <https://curipod.com/ai>

Settings | | | | Untitled presentation | Share | Present

Generate with AI | Create your own

### < Mini Project

Add all 3 slides

Re-generate

#### 1 Drawings

Question: How does photosynthesis provide energy to plants?

Clues:

- Photosynthesis is a process that uses sunlight to turn water and carbon dioxide into glucose and oxygen.
- Plants use the glucose as an energy source to grow and survive.
- Oxygen is released into the atmosphere.

In pairs: Select and solve one of the tasks:

A. In pairs, draw a diagram of the photosynthesis process.  
B. Explain how the process works in your own words.

#### 2 Drawings

Question: How does photosynthesis work?

Join at [curi.live](https://curi.live) with pin: 21968

Curipod

Question: How does photosynthesis provide energy to plants?

Clues:

- Photosynthesis is a process that uses sunlight to turn water and carbon dioxide into glucose and oxygen.
- Plants use the glucose as an energy source to grow and survive.
- Oxygen is released into the atmosphere.

In pairs: Select and solve one of the tasks:

A. In pairs, draw a diagram of the photosynthesis process.  
B. Explain how the process works in your own words.

#### 1 Drawings

#### 2 Drawings

#### 3 Drawings

#### 4 Personalised Feed

#### 5 Personalised Feed

#### 6 Personalised Feed

#### 7 Personalised Feed



## Creative ideas for teaching photosynthesis in 6th-grade class

Please suggest some creative ideas for teaching photosynthesis in 6th-grade science class

- ✓ Zoeken naar 'creative ideas for teaching photosynthesis'
- ✓ Antwoorden voor u genereren...

Some creative ideas for teaching photosynthesis in 6th-grade science class are:

- You can have students create a rap song or a poem about photosynthesis, using the key terms and concepts they learned. You can provide them with some examples, such as [this rap song](#) or [this poem](#), or let them come up with their own lyrics and rhymes. You can also have them perform their songs or poems in front of the class or record them and share them online <sup>1</sup>.
- You can have students design and make a model of a plant cell that shows how photosynthesis takes place. You can provide them with different materials, such as clay, paper, cardboard, plastic, etc., or let them use recycled or natural materials. You can also have them label the parts of their model and explain how they function in photosynthesis <sup>1</sup>.
- You can have students conduct a leaf chromatography experiment to separate and identify the different pigments in plant leaves. You can provide them with different types of leaves, such as spinach, kale,

What are some other creative ideas for teaching science?

- ✓ Zoeken naar 'other creative ideas for teaching science'
- ✓ Antwoorden voor u genereren...

Some other creative ideas for teaching science are:

- You can have students create a comic strip or a storyboard that illustrates a scientific concept or phenomenon, such as the water cycle, the food chain, or the solar system. You can provide them with templates, examples, or online tools, such as [Storyboard That](#) or [Pixton](#), to help them design and share their comics. You can also have them present their comics to the class and explain how they used visual elements, such as colors, shapes, symbols, and captions, to convey scientific information <sup>1 2</sup>.
- You can have students design and conduct their own science experiments or investigations, based on their interests and questions. You can provide them with guidelines, resources, and materials to help them plan, execute, and report their experiments. You can also have them showcase their experiments at a science fair or a science exhibition, where they can demonstrate their methods, results, and conclusions to their peers and other audiences <sup>3 4</sup>.
- You can have students write and perform a science skit or a play that dramatizes a scientific concept or



## PROMPT:

*Create a lesson plan for a 6th-grade science class on the topic of photosynthesis applying Rosenschine's research-based principles: begin a lesson with a short review of the previous learning, present material in small steps as learners practice it at each step, limit the amount of material students receive at one time, give clear and detailed explanations, ask a large number of questions and check for understanding, provide a high level of active practice, think aloud and model steps, provide work out examples, provide systematic feedback, prepare students for independent practice, monitor students' independent practice.*

<https://teachermatic.com>

<https://curipod.com/ai>



## Describe a set of **Instructional design** guidelines for constructing an innovative higher education learning environment...(Bing)

Describe a set of Instructional design guidelines for constructing an innovative higher education learning environment. The design guidelines should be based on evidence-informed Instructional design approaches such as Cognitive Apprenticeship Approach, Cognitive-Flexibility Theory, Four Component Instructional Design Model, and Problem-Based Learning. You can refer to other Instructional design approaches. Examples of Instructional design guidelines are: Confront students with real-life problems representing a particular professional practice. Increase complexity by constructing a sequence of tasks so that more and more skills and concepts are required for expert performance. Increase diversity by constructing a sequence of tasks in which a broader and wider variety of strategies or skills are required. Increase flexibility in responding to highly diverse new cases by reasoning from precedent cases. Include cognitive strategies modelling that involves an expert performing a task. Make the expert's tacit processes visible so students can observe, enact, and practice them with help from the expert. Enable students to compare their problem-solving processes with those of an expert. Observe students while they carry out a task and offer hints, scaffolding, feedback, modelling, reminders, and new tasks to bring their performance closer to expert performance. Show different, even contradictory, points of view or perspectives. Promote multiple representations (e.g., multiple precedent cases for a new case, multiple organizational schemes for representing the same content material). Provide opportunities for practicing.

Here is a possible set of instructional design guidelines for constructing an innovative higher education learning environment:

- Define clear learning outcomes and align them with the tasks, assessments, and feedback mechanisms.
- Design authentic tasks that are relevant, meaningful, and challenging for the learners, and that reflect the complexity and diversity of the real-world situations they will encounter in their professional practice.
- Provide scaffolding and guidance to support learners' cognitive, metacognitive, and affective processes, such as modelling, coaching, articulation, reflection, exploration, and collaboration.
- Foster cognitive flexibility by exposing learners to multiple perspectives, representations, and contexts, and by encouraging them to compare, contrast, and integrate them.
- Promote self-regulated learning by enabling learners to monitor, evaluate, and adjust their own learning strategies and progress, and by providing timely and constructive feedback.
- Facilitate social learning by creating opportunities for learners to interact with peers, instructors, experts, and other stakeholders, and by fostering a sense of community and belonging.
- Incorporate adaptive and personalized learning features that can tailor the learning experience to the individual needs, preferences, and goals of each learner.
- Utilize emerging technologies and media that can enhance the learning experience, such as simulations, games, virtual reality, augmented reality, artificial intelligence, etc.
- Evaluate the effectiveness of the instructional design using appropriate methods and metrics, such as learner satisfaction, engagement, retention, performance, etc.

I hope this helps. How else can I help?



## Describe a set of **Learning-experience design** guidelines for constructing an innovative higher education learning environment...(Bing)

Describe a set of learning experience design guidelines for constructing an innovative higher education learning environment. The design guidelines should be based on evidence-informed learning experience design approaches such as Cognitive Apprenticeship Approach, Cognitive-Flexibility Theory, Four Component Instructional Design Model, and Problem-Based Learning. You can refer to other learning/experience design approaches. Examples of learning-experience design guidelines are: Confront students with real-life problems representing a particular professional practice. Increase complexity by constructing a sequence of tasks so that more and more skills and concepts are required for expert performance. Increase diversity by constructing a sequence of tasks in which a broader and wider variety of strategies or skills are required. Increase flexibility in responding to highly diverse new cases by reasoning from precedent cases. Include cognitive strategies modelling that involves an expert performing a task. Make the expert's tacit processes visible so students can observe, enact, and practice them with help from the expert. Enable students to compare their problem-solving processes with those of an expert. Observe students while they carry out a task and offer hints, scaffolding, feedback, modelling, reminders, and new tasks to bring their performance closer to expert performance. Show different, even contradictory, points of view or perspectives. Promote multiple representations (e.g., multiple precedent cases for a new case, multiple organizational schemes for representing the same content material). Provide opportunities for practicing.

Here is a possible set of learning experience design guidelines for constructing an innovative higher education learning environment:

- Define clear learning outcomes and align them with the tasks, assessments, and feedback mechanisms.
- Design authentic tasks that are relevant, meaningful, and challenging for the learners, and that reflect the complexity and diversity of the real-world situations they will encounter in their professional practice.
- Provide scaffolding and guidance to support learners' cognitive, metacognitive, and affective processes, such as modelling, coaching, articulation, reflection, exploration, and collaboration.
- Foster cognitive flexibility by exposing learners to multiple perspectives, representations, and contexts, and by encouraging them to compare, contrast, and integrate them.
- Promote self-regulated learning by enabling learners to monitor, evaluate, and adjust their own learning strategies and progress, and by providing timely and constructive feedback.
- Facilitate social learning by creating opportunities for learners to interact with peers, instructors, experts, and other stakeholders, and by fostering a sense of community and belonging.
- Incorporate adaptive and personalized learning features that can tailor the learning experience to the individual needs, preferences, and goals of each learner.
- Utilize emerging technologies and media that can enhance the learning experience, such as simulations, games, virtual reality, augmented reality, artificial intelligence, etc.
- Evaluate the effectiveness of the learning experience design using appropriate methods and metrics, such as learner satisfaction, engagement, retention, performance, etc.

I hope this helps. How else can I help?



## Describe a set of **Learning design** guidelines for constructing an innovative higher education learning environment...(Bing)

Describe a set of learning design guidelines for constructing an innovative higher education learning environment. The design guidelines should be based on evidence-informed learning design approaches such as Cognitive Apprenticeship Approach, Cognitive-Flexibility Theory, Four Component Instructional Design Model, and Problem-Based Learning. You can refer to other learning design approaches. Examples of learning design guidelines are: Confront students with real-life problems representing a particular professional practice. Increase complexity by constructing a sequence of tasks so that more and more skills and concepts are required for expert performance. Increase diversity by constructing a sequence of tasks in which a broader and wider variety of strategies or skills are required. Increase flexibility in responding to highly diverse new cases by reasoning from precedent cases. Include cognitive strategies modelling that involves an expert performing a task. Make the expert's tacit processes visible so students can observe, enact, and practice them with help from the expert. Enable students to compare their problem-solving processes with those of an expert. Observe students while they carry out a task and offer hints, scaffolding, feedback, modelling, reminders, and new tasks to bring their performance closer to expert performance. Show different, even contradictory, points of view or perspectives. Promote multiple representations (e.g., multiple precedent cases for a new case, multiple organizational schemes for representing the same content material). Provide opportunities for practicing.

I have already answered this question in the previous turn. Please see my response above. Do you have any other questions?

Do you make a difference between learning-experience design and learning design?

Yes, I do make a difference between learning-experience design and learning design. Based on the web search results, learning-experience design is a broader and more holistic approach that focuses on the learner's journey, emotions, motivations, and goals, while learning design is more concerned with the instructional strategies, content, and outcomes of a specific learning intervention. Learning-experience design also incorporates elements from user experience design, such as empathy, user research, prototyping, and testing. Learning design, on the other hand, follows a more linear and structured process, such as ADDIE (Analysis, Design, Development, Implementation, and Evaluation). Learning-experience design is more suitable for creating engaging, personalized, and adaptive learning experiences that leverage emerging technologies and media. Learning design is more appropriate for designing effective, efficient, and consistent learning solutions that align with the learning objectives and assessments.



## Describe a set of **Learning design** guidelines for constructing an innovative higher education learning environment... (Bing: a new chat)

Describe a set of Learning design guidelines for constructing an innovative higher education learning environment. The design guidelines should be based on evidence-informed Learning design approaches such as Cognitive Apprenticeship Approach, Cognitive-Flexibility Theory, Four Component Instructional Design Model, and Problem-Based Learning. You can refer to other learning design approaches. Examples of learning design guidelines are: Confront students with real-life problems representing a particular professional practice. Increase complexity by constructing a sequence of tasks so that more and more skills and concepts are required for expert performance. Increase diversity by constructing a sequence of tasks in which a broader and wider variety of strategies or skills are required. Increase flexibility in responding to highly diverse new cases by reasoning from precedent cases. Include cognitive strategies modelling that involves an expert performing a task. Make the expert's tacit processes visible so students can observe, enact, and practice them with help from the expert. Enable students to compare their problem-solving processes with those of an expert. Observe students while they carry out a task and offer hints, scaffolding, feedback, modelling, reminders, and new tasks to bring their performance closer to expert performance. Show different, even contradictory, points of view or perspectives. Promote multiple representations (e.g., multiple precedent cases for a new case, multiple organizational schemes for representing the same content material). Provide opportunities for practicing.

Here are some possible learning design guidelines for constructing an innovative higher education learning environment, based on evidence-informed learning design approaches:

- Define clear learning outcomes and align them with the tasks, assessments, and feedback.
- Use authentic tasks that are relevant, meaningful, and challenging for the learners, and that reflect the complexity and diversity of real-world situations.
- Provide scaffolding and guidance to support learners in completing the tasks, such as modelling, coaching, mentoring, prompting, questioning, and feedback.
- Encourage learners to engage in collaborative learning activities, such as group discussions, peer feedback, and joint problem-solving, and provide tools and strategies to facilitate effective communication and coordination.
- Foster learners' metacognitive skills, such as planning, monitoring, evaluating, and reflecting on their own learning processes and outcomes, and provide tools and strategies to support self-regulation and self-assessment.
- Incorporate multiple sources of information and multiple perspectives on the topics or problems, and help learners to compare, contrast, integrate, and synthesize them.
- Promote learners' cognitive flexibility by exposing them to different types of problems or cases that require different approaches or solutions, and by providing opportunities for transfer and generalization of knowledge and skills across contexts.
- Stimulate learners' motivation and interest by providing choices, challenges, feedback, rewards, and recognition, and by connecting the learning to their personal goals and values.

I hope this helps. How else can I help?





## AI AND EDUCATIONAL DESIGN RESEARCH

- Identifying user needs in context
- Data collection methods (interviews, observations, surveys, contextual inquiry, cognitive task analysis, and literature review)
- Data analysis methods (affinity mapping, card sorting, Group Concept Mapping)
- Personas
- Prototyping



What are methods of Educational Design Research for data collection and analysis?



Educational Design Research (EDR), also known as Design-Based Research (DBR), is an approach that aims to simultaneously develop educational innovations and build theory through iterative cycles of design, enactment, analysis, and redesign. EDR is characterized by its emphasis on addressing complex educational problems in real-world settings and its commitment to iterative, reflective, and collaborative design.

Given the nature of EDR, a variety of data collection and analysis methods can be employed. Here are some commonly used methods:

### Data Collection Methods:

1. **Observations:** Direct observation of participants in educational settings can provide insights into how an intervention is being used and its effects on learning.
2. **Interviews:** Semi-structured or open-ended interviews can be used to gather in-depth information about participants' experiences, beliefs, and perceptions.
3. **Surveys and Questionnaires:** These can be used to gather data from a larger number of participants.

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## GROUP CONCEPT MAPPING (GCM)

- Identifying user needs in context
- GCM is a mix-methods and a consensus-driven approach
- Includes some well-known activities for data collection such as brainstorming of ideas, sorting of the ideas into thematic groups and rating of the ideas on some values (e.g., importance and easy/difficult to achieve)
- Combines qualitative data collection with advanced statistical techniques for data analysis (e.g., multidimensional scaling and hierarchical cluster analysis)
- Aggregates participants' contributions and shows their shared collective perspectives on what are the design ideas, how they are related, how they are grouped into more general categories, and how they are valued.

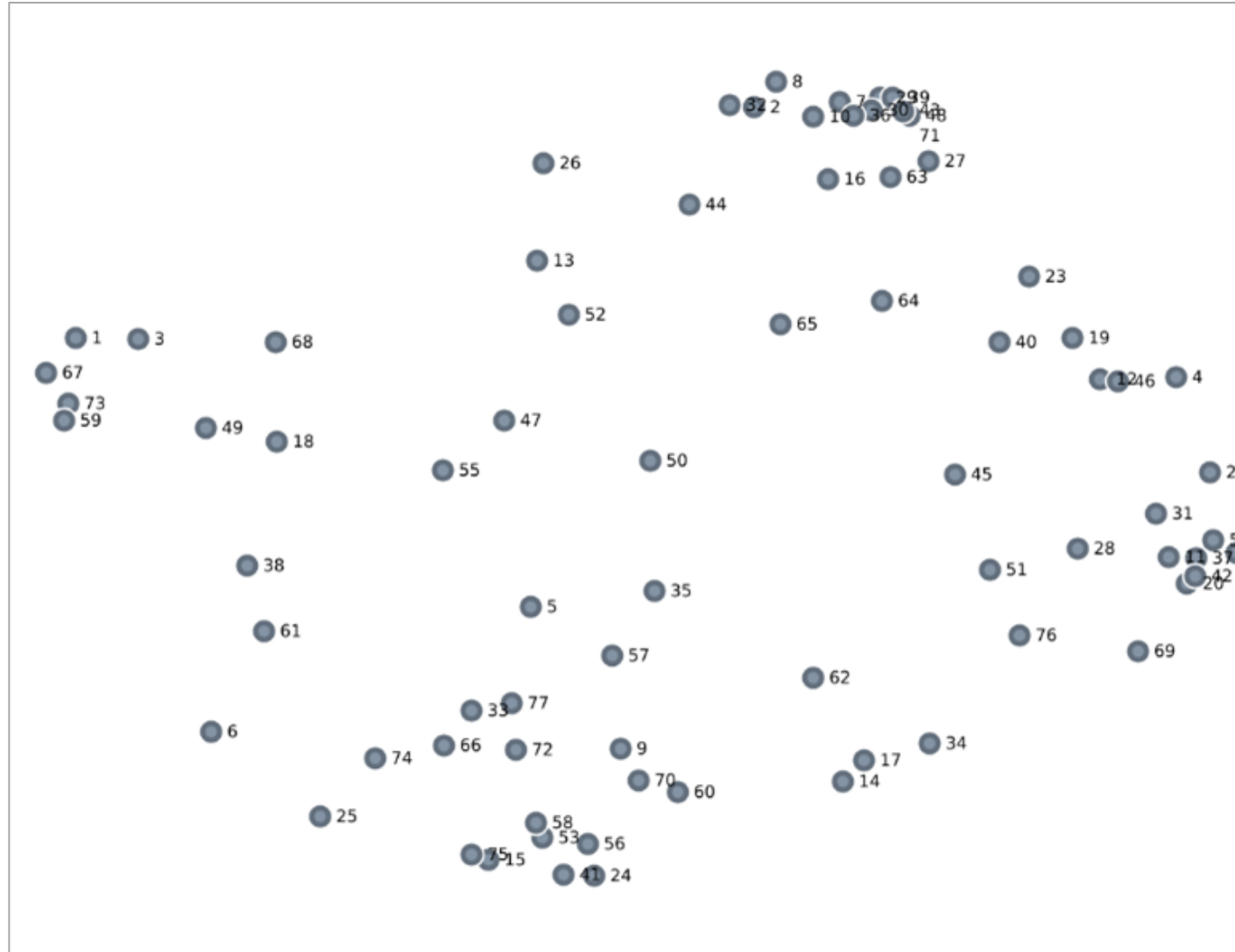


Could you please provide some information about the method of Group Concept Mapping



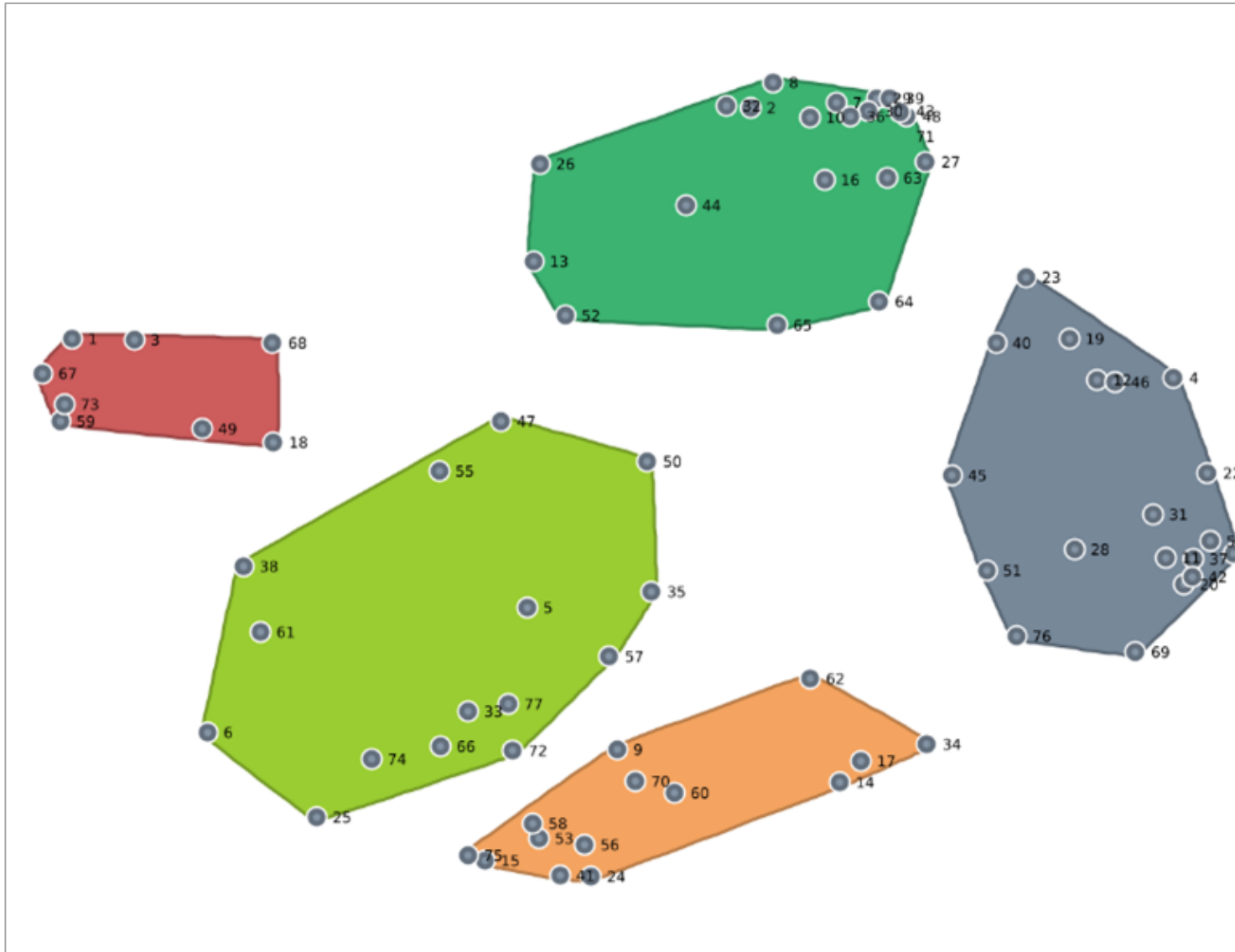
Group Concept Mapping (GCM) is a participatory, mixed-method research approach that integrates qualitative and quantitative data collection and analysis techniques. It's often used to generate ideas, represent complex relationships, and develop action plans around a specific topic. This method is particularly useful for engaging diverse groups of stakeholders in decision-making and planning processes. Here's a basic outline of the method:

1. **Preparation:** Clearly define the focus or question for the concept mapping. Identify and recruit participants who have knowledge or experience related to the focus question.
2. **Idea Generation (Brainstorming):** Participants generate a list of statements in response to a focus question. The goal is to gather a wide range of ideas that cover the breadth of the concept under investigation. For example, if the focus is on 'ways to improve workplace wellbeing', participants might generate ideas like 'increase flexible working hours', 'offer free gym members', 'improve office spaces', and so on.



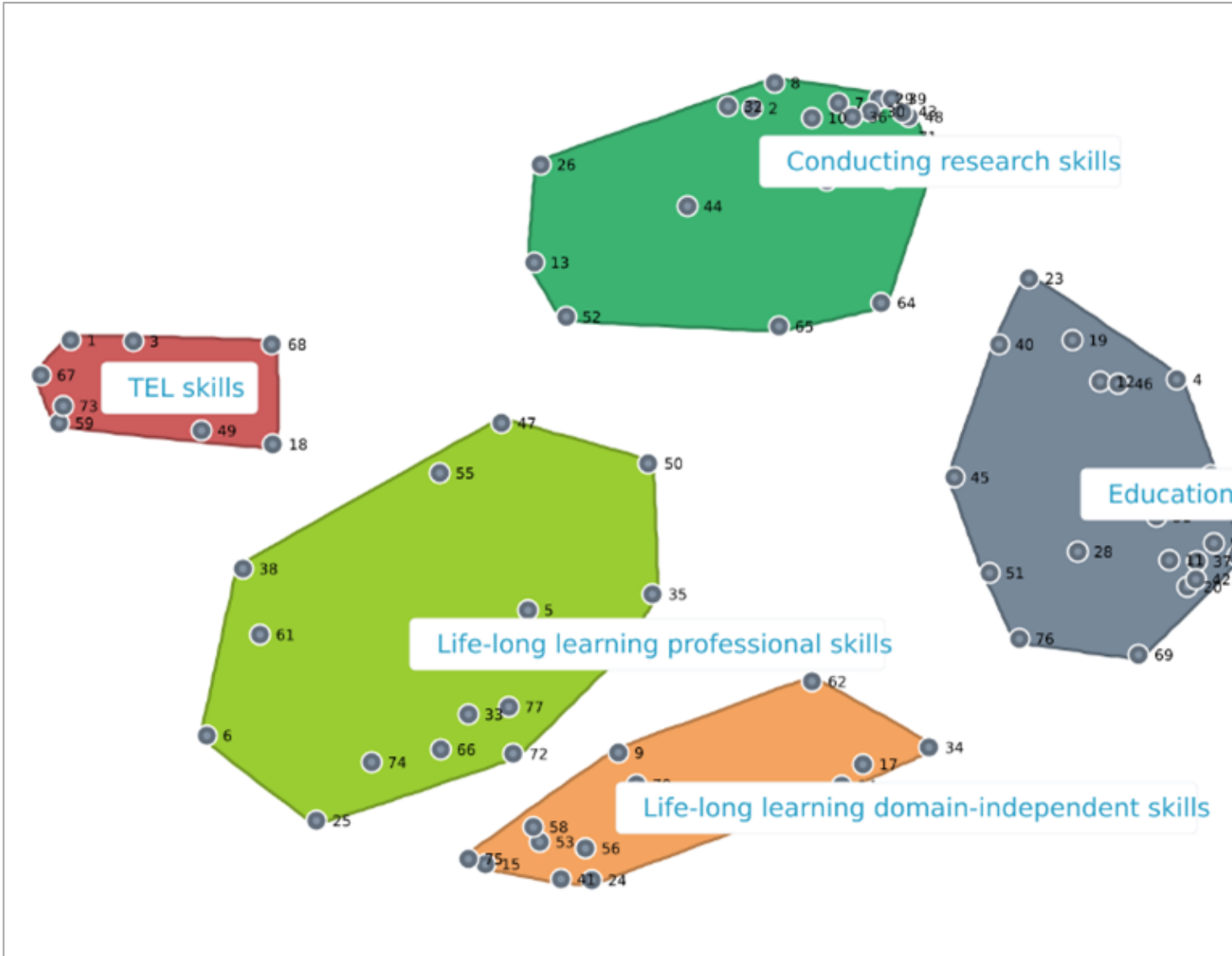
## GCM OUTCOMES (A POINT MAP)

- Relationships between ideas



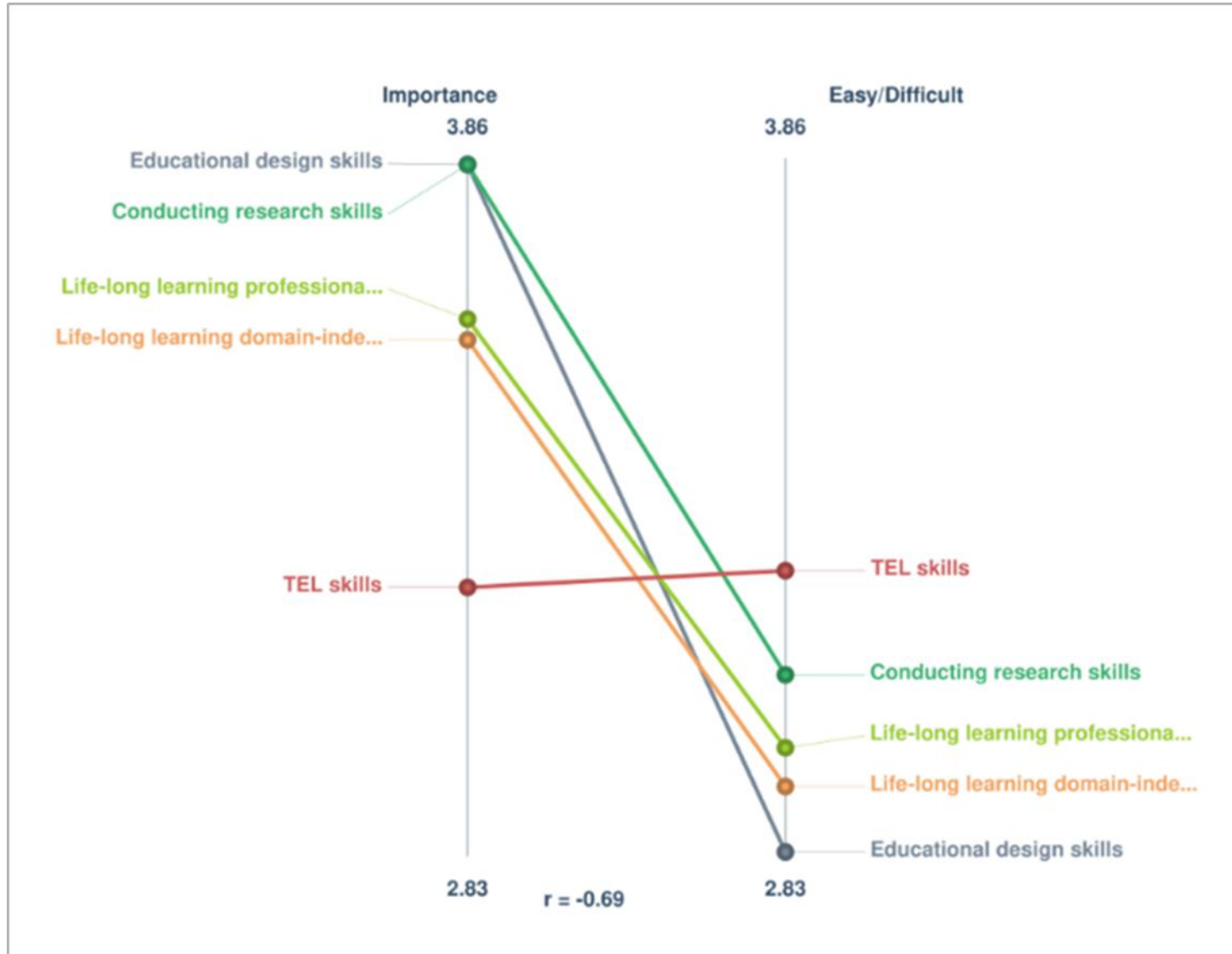
## GCM OUTCOMES (CLUSTER MAP)

- Thematic categories



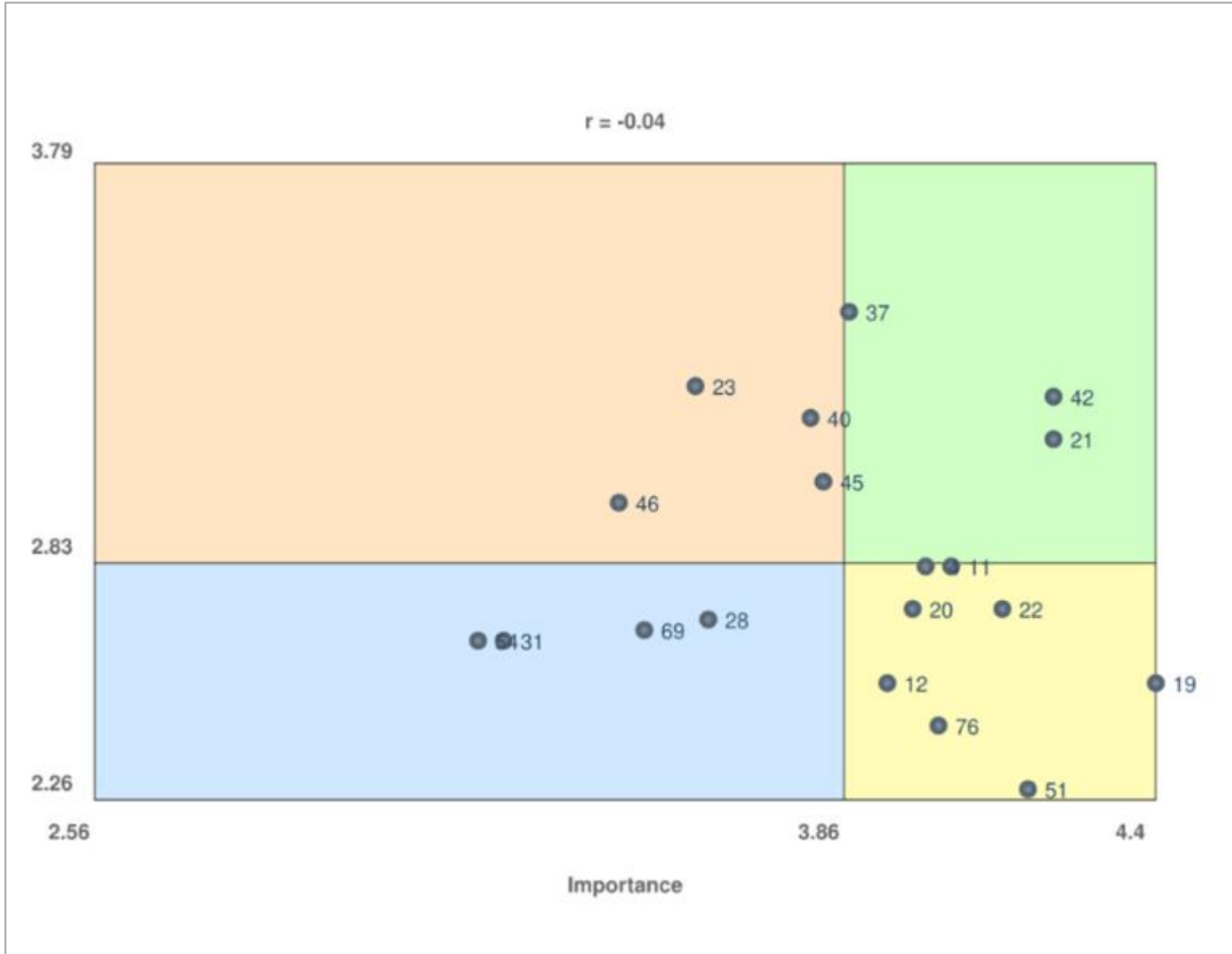
## GCM OUTCOMES (CLUSTER MAP THEMATIC NAMES)

- Thematic areas named



## GCM OUTCOMES (PATTERN MATCH)

- Rating values compared at cluster level



## GCM OUTCOMES (ZO-ZONE)

- Within cluster comparison of rating values



## INVOLVEMENT OF DIFFERENT PARTICIPANTS AND INTEGRATION OF DATA COLLECTION METHODS

- Brainstorming
- Interviews
- Observations
- Surveys
- Contextual inquiry
- Cognitive task analysis
- Literature review
- AI tools

The screenshot displays the 'ACTIVITY MONITOR' interface. On the left is a dark sidebar with navigation options: Participant Questions, Brainstorming (highlighted), Sorting, Rating, PARTICIPANT DATA (with sub-items: Participants, Offline data manager, Review Data), and ANALYSIS & REPORTING (with sub-items: Analysis, Reports). The main area shows a 'Focus Prompt' with the text: 'After finishing the MSc Programme in Educational Sciences, the students should be able to... / Na het afronden van de masteropleiding Onderwijswetenschappen, moeten studenten ...'. Below the prompt is a search bar labeled 'SEARCH STATEMENTS OR KEYWORDS', a 'KEYWORD' dropdown menu, and a 'NEW STATEMENT' button. A list of statements is shown, each with a checkbox and a number:

- # STATEMENTS (85)
- 1 SWOT kunnen uitvoeren van ontwerpalternatieven
- 2 Diepgaand begrip hebben van basiskennis van onderwijskundige principes en theorieën
- 3 Op een wijze die aansluit op de beoogde doelgroep over onderzoek (begrijpelijk /toegankelijk) kunnen communiceren voor, tijdens en na het onderzoeksproces
- 4 Kunnen meedenken over de inrichting van leven lang ontwikkelen





## INVOLVEMENT OF DIFFERENT PARTICIPANTS AND INTEGRATION OF DATA COLLECTION METHODS

- Group the statements for how similar in meaning or theme they are to one another
- Give each category a name that describes its theme or contents
- Put a statement alone in its own category if it is unrelated to all the other statements
- Do not create categories according to priority, or value, such as 'Important', 'Hard To Do', or 'Easy to apply'.
- Do not create categories such as 'Miscellaneous', 'Junks' or "Other" that group together dissimilar statements.

The screenshot shows a digital sorting interface. On the left, there is a 'Cards' panel with four items:

- 1 SWOT kunnen uitvoeren van ontwerpalternatieven
- 2 Diepgaand begrip hebben van basiskennis van onderwijskundige principes en theorieën
- 3 Op een wijze die aansluit op de beoogde doelgroep over onderzoek (begrijpelijk /toegankelijk) kunnen communiceren voor, tijdens en na het onderzoeksproces [less](#)
- 4 Kunnen meedenken over de

The main area on the right has a header '← Sorting' and 'ENG'. Below it, it says '0 of 85 statements sorted' and 'More info >'. A 'FINISH' button is in the top right. A 'FOCUS PROMPT' section contains the text: 'After finishing the MSc Programme in Educational Sciences, the students should be able to... /Na het afronden van de masteropleiding Onderwijswetenschappen, moeten studenten ...'. Below the prompt are 'Expand All' and 'Collapse All' options. A hand-drawn arrow points from the text 'Drag and drop cards to create piles' to the cards panel.

(The Concept System® groepswisdom™, 2023)



## IDEAS STRUCTURING THROUGH RATING

Please rate each statement on a 1 to 5 scale for how important it is, where '1' equals lowest importance and '5' equals highest importance. It is essential to use the whole range of ratings (1 to 5).

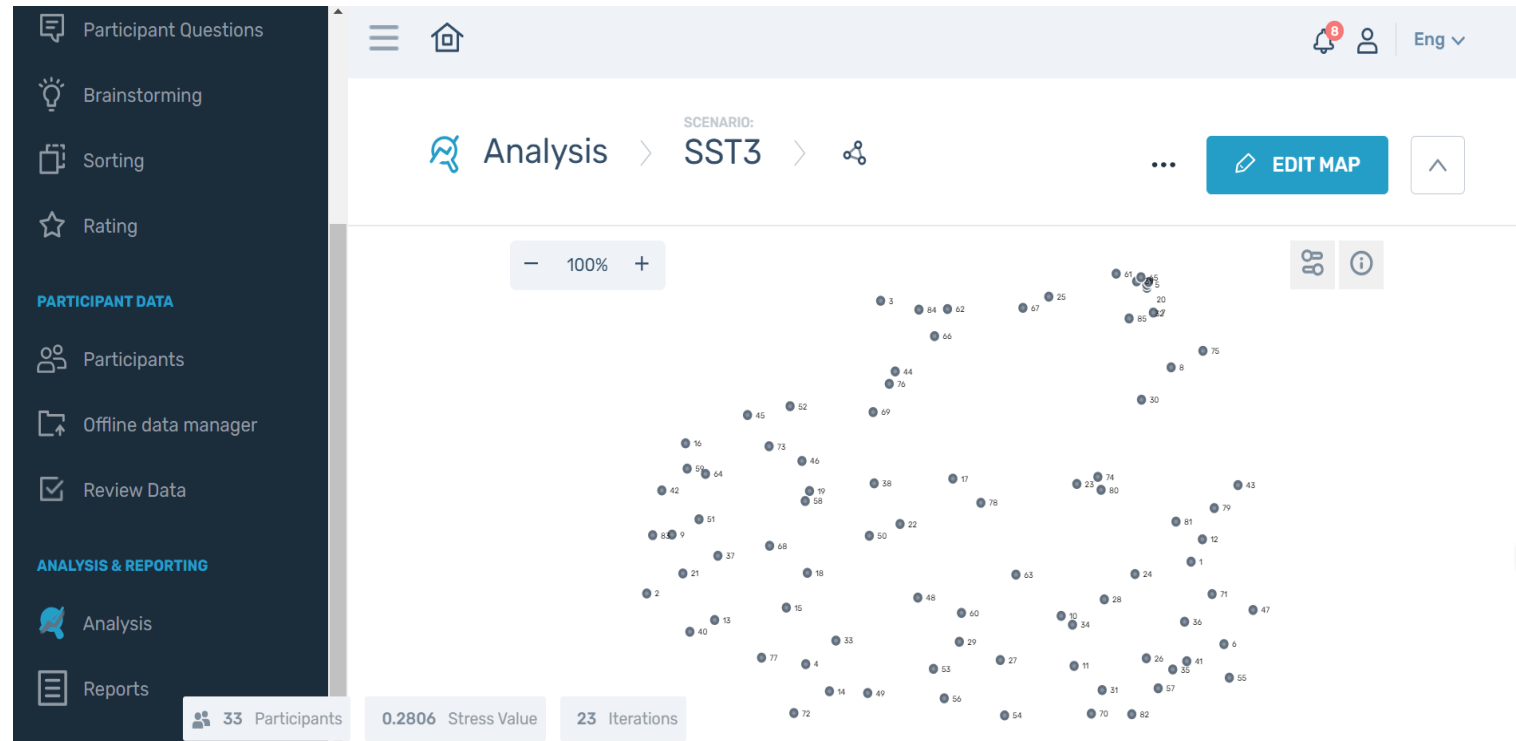
The screenshot shows a web interface for rating statements. At the top, there is a navigation bar with a back arrow, the word 'RATING', and 'Importance'. In the top right corner, there is a language selector 'ENG' with a dropdown arrow. Below the navigation bar, there is a header section with a speaker icon, the text '0 of 85 statements rated', a 'More info >' link, and a 'FINISH' button. The main content area has a 'FOCUS PROMPT:' section with the text: 'After finishing the MSc Programme in Educational Sciences, the students should be able to... /Na het afronden van de masteropleiding Onderwijswetenschappen, moeten studenten ...'. Below this, it says 'Page 1 of 1' and 'Statements 1 to 85'. To the right, there is a filter section 'On this page:' with three options: 'All (85)' (which is selected and underlined), 'Unrated (85)', and 'Rated (0)'. At the bottom, there is a list of statements, with the first one being '1 SWOT kunnen uitvoeren van ontwerpalternatieven'. Below this statement is a 5-point rating scale with five empty circles labeled 1 through 5.

(The Concept System® groepswisdom™, 2023)



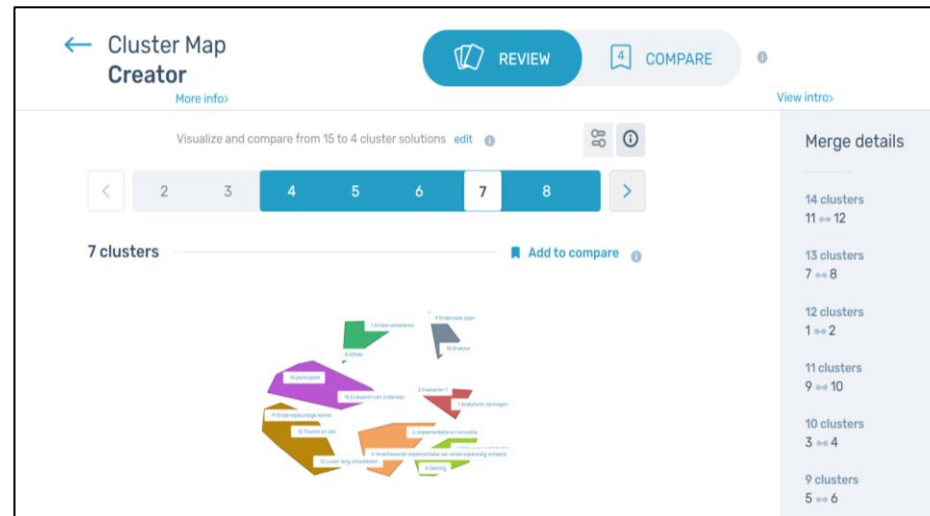
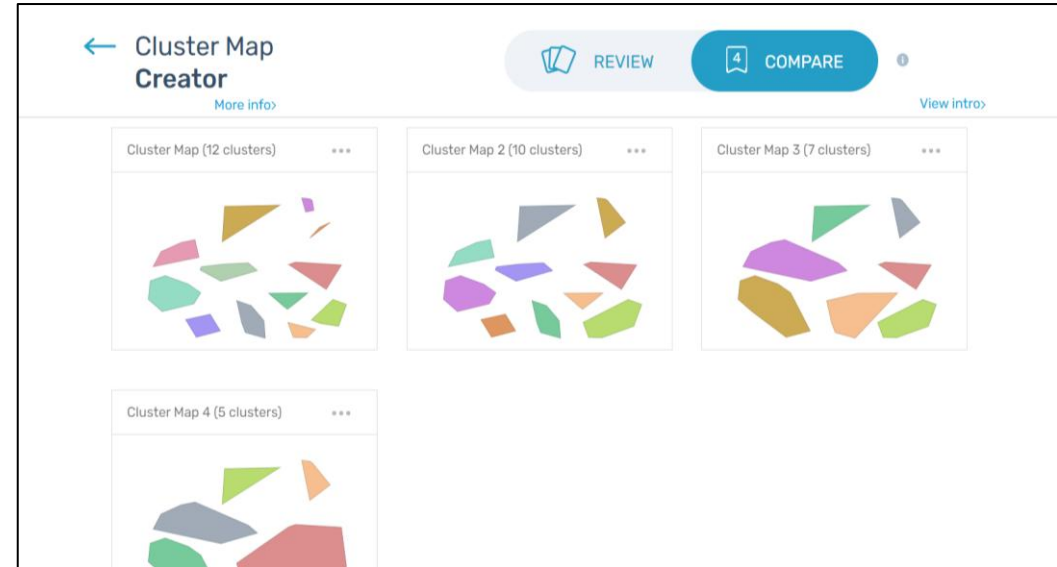
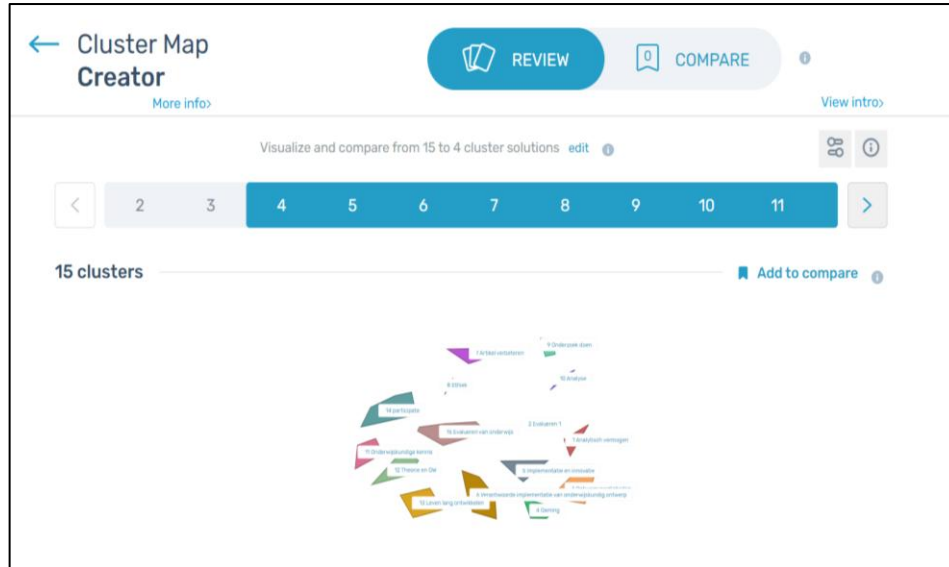
## ANALYSIS: A POINT MAP

- Multidimensional scaling on participants' ideas groupings
- Stress index – internal validity
- Bridging value



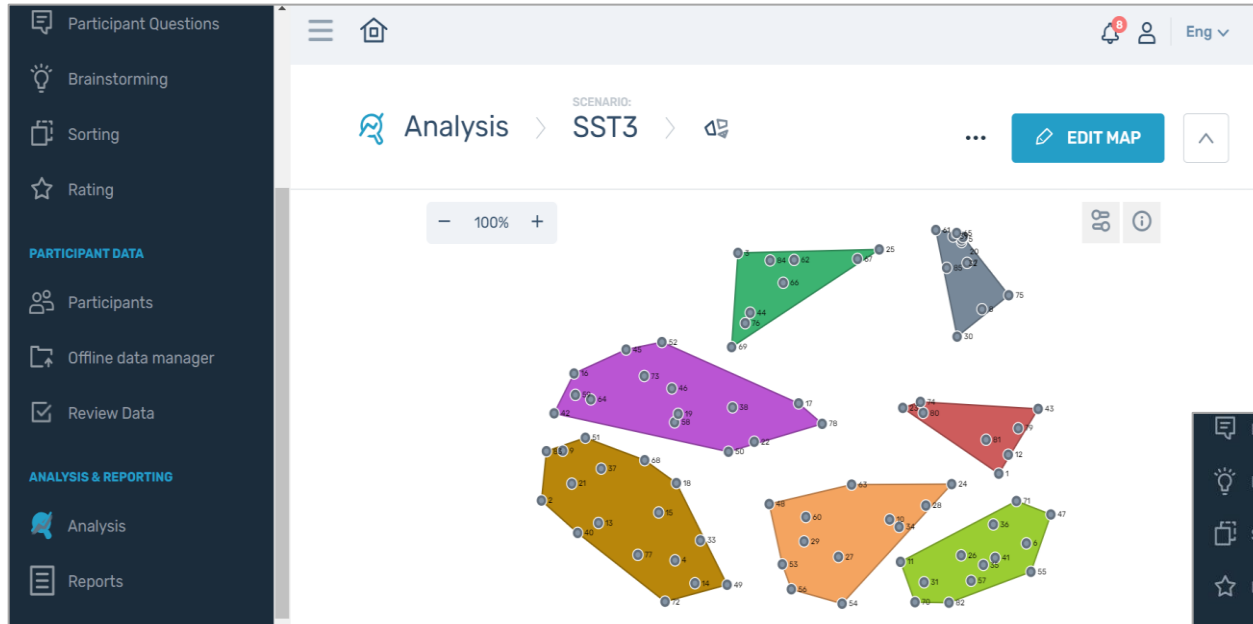


# ANALYSIS: CLUSTER SOLUTION SELECTION

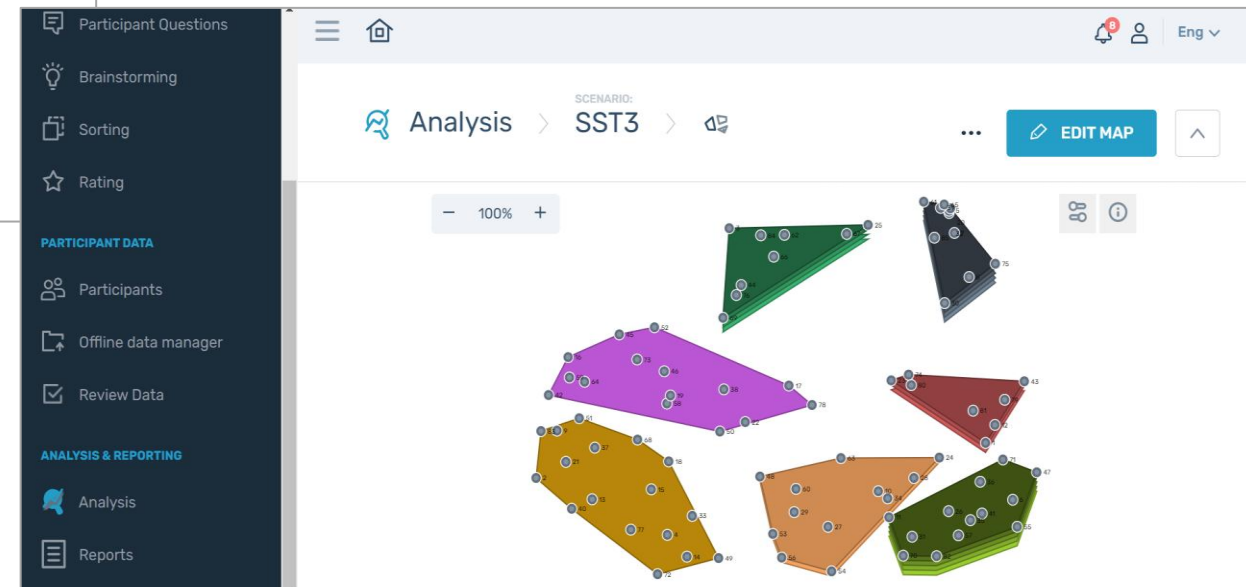




# ANALYSIS: CLUSTER MAP AND CLUSTER RATING MAP

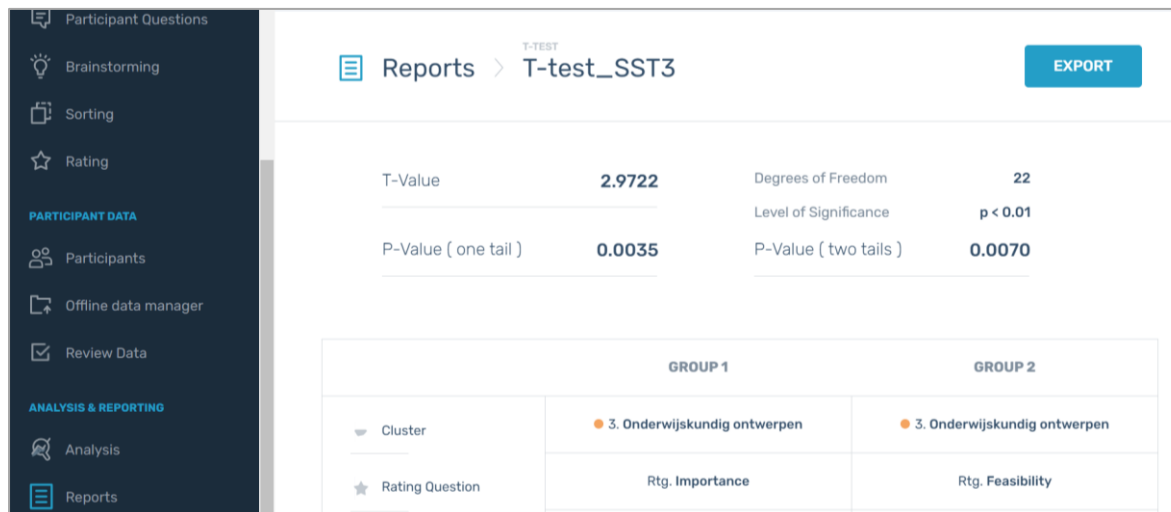
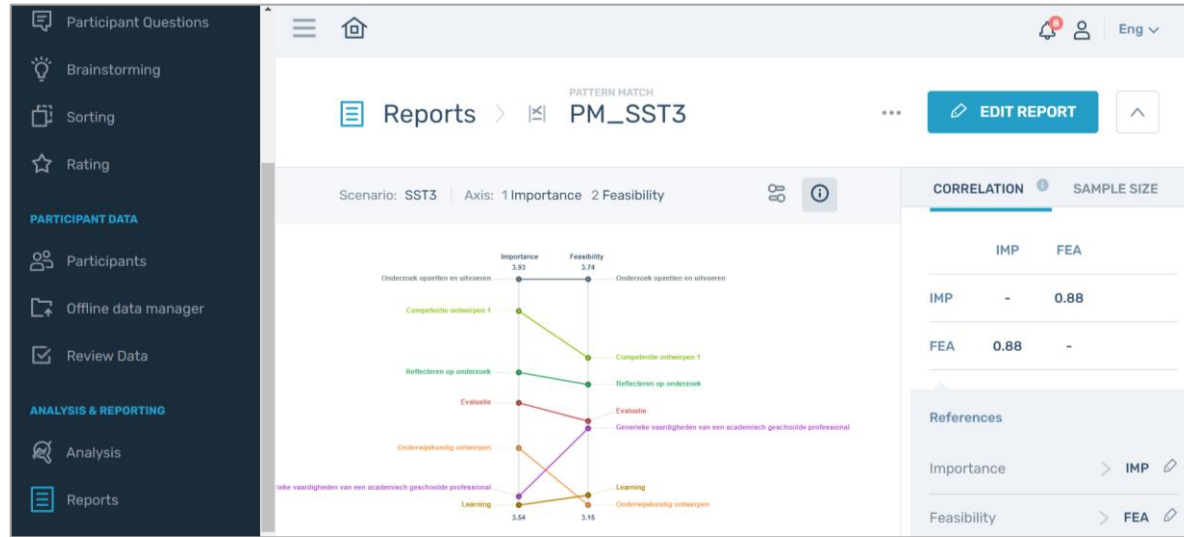


(The Concept System® groupwisdom™, 2023)





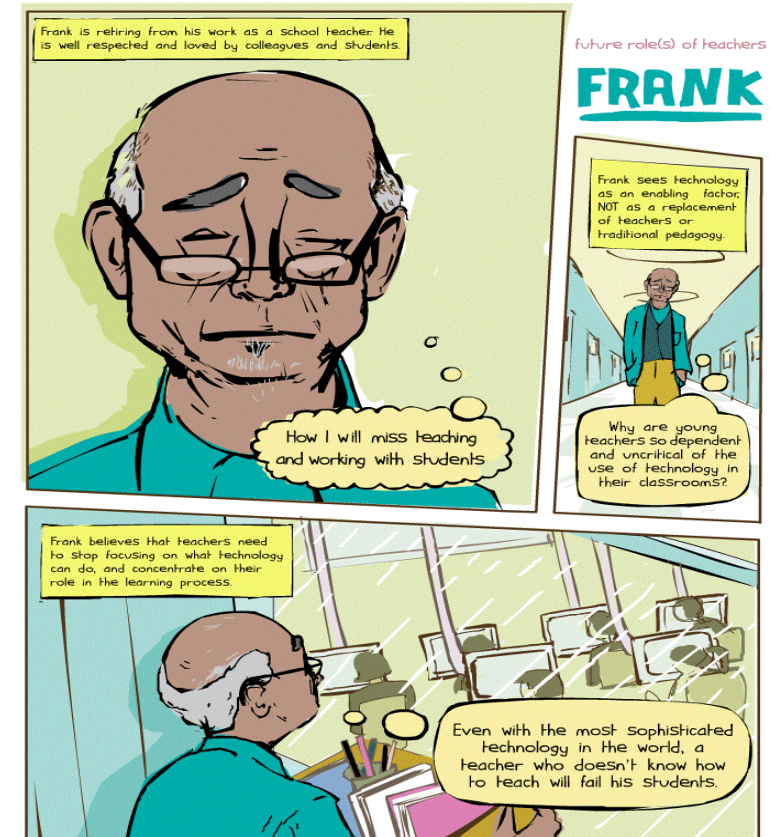
# ANALYSIS: PATTERN MATCH, GO-ZONE, AND T-TEST



(The Concept System® groepswisdom™, 2023)



# GCM findings inform next steps of design: creating of design personas, design for learning blueprint/ prototypes; AI can help



(Redecker et. al., 2011)



## AI TOOLS FOR RESEARCH

Scite	Elicit	Chatdoc
Semantic Scholar	Grammarly	Chatpdf
Litmaps	Quilbox	Explainpapers
Connecting papers	Trinka	Humata
Research Rabbit		





## CONCLUDING THOUGHTS (1)

- AI presents a double-edged sword for education. At the same time, it undermines the integrity of existing academic systems of assessments, it also offers an opportunity to rethink how we define learning and assessment for better use.
- Current responses to the challenges raised by AI, including returning to in-classroom exams and investing in AI detection technologies, are impractical and fail to address the root cause of the problem: a system in which learning and assessment centre around the ability to recall and reframe information.
- Rather than resisting AI, universities should apply innovative pedagogies and learning designs.
- Embracing AI in higher education prepares students for the increasingly technology-driven job market.
- Traditional higher education must engage positively with AI to maintain its competitiveness and relevance.

(Hardman, 2023)



## CONCLUDING THOUGHTS (2)

- The AI prompt is a showcase of your professional expertise
- AI prompt should be theoretically grounded and research-based
- AI prompt is a prototype that needs to be tried out and improved
- The locus of control is on ID/LD/LX designers
- AI tools can be a helpful 'companion'/'colleague'/'assistant'
- AI outcomes are unpredictable and could be unreliable and biased.



## THANK YOU!

### SPEAKER

Short bio

**Slavi Stoyanov, a PhD in instructional technology**, is currently with the Department of Technology-Enhanced Learning Innovation at the Open University of The Netherlands. He teaches and supervises MSc students and PhD candidates, with research interests in design for learning, technology-mediated learning, and individual differences in learning. He is internationally recognized as one of the leading experts in Group Concept Mapping research methodology.

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