Card-Based Instructional Design method

to create innovative teaching on Hydrogen energy

User Guide

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ID CARDS

The development of this instructional design method was carried out as part of the Hyschool project

The Hyschools project aims to provide European teachers with a set of pedagogical and professional resources for teaching concepts related to hydrogen energy

This project is supported by the European Union within the framework of the Erasums + projects

HySchools

Inspiring the
talent of tomorrow

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Principles

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ID Cards

an Instructional Design tool

This tool aims to support a rapid production of innovative teaching by forcing designers to integrate into their instructional design four pedagogical dimensions.

These dimensions define the different families of cards.

#1 LEARNING EVENT ⊕ ID CARDS

#2 FINAL WORK ⊕ ID CARDS

Hydrogen Energy ⊕ ID CARDS

#3 TRANSVERSAL COMPETENCE ⊕ ID CARDS

«Instructional design is the practice of creating instructional experiences which make the acquisition of knowledge and skill more efficient, effective, and appealing» (Merill et al, 1996)

a Participatory Design tool

Solving a difficulty is more effective when you collaborate. Moreover, the creativity of others stimulates yours.

Pedagogical sequences

Teacher's document

Researcher

Educational advisor

Facilitator/animator
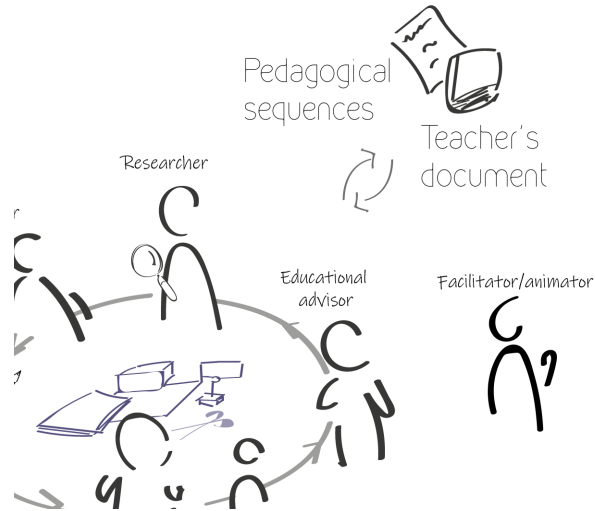
Participatory design is increasingly used when designing technological solutions. This design approach is based on human, creative and effective relationships between those who are generally involved in the design of the technology and those who will use it.

Thus, it seeks the active participation of future users to meet their needs and provide an acceptable, attractive and effective solution.

The IDCards method allows non-designers to address a vast range of instructional design challenges. Following a set of interdependent steps, the participants are invited to think like a designer, and not only like a teacher, a hydrogen expert etc.,

This design thinking orchestration aims to takes advantage of the different points of view that compose a design team, to accelerate the design process and leverage the pedagogical quality of the designed learning program.
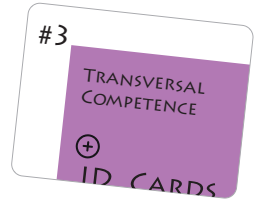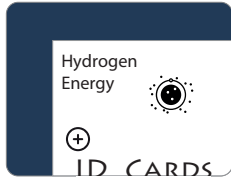
Design thinking relies on the human ability to be intuitive, to recognize patterns, and to construct ideas that are emotionally meaningful as well as functional.

Cards Description

ID Cards

The set is composed of 4 families of cards, each dealing with an element to be integrated into the design of the learning sessions

#1

LEARNING EVENT

⊕
ID CARDS

#1

DEBATE

#2

SHORT VIDEO

#4

GLOBAL CITIZENSHIP

STORAGE

Hydrogen Energy

⊕
ID CARDS

#2

FINAL WORK

⊕
ID CARDS

#3

TRANSVERSAL COMPETENCE

⊕
ID CARDS
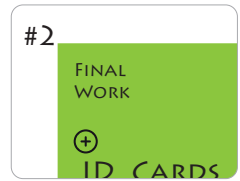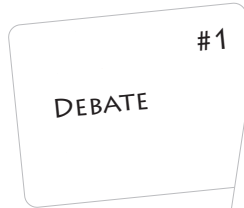
1 : The Learning Events

A learning event, as defined by D. Leclercq and M. Poumay (2008), corresponds to the action that students use to learn.
The learning session to design, depending on the chosen card, have to enable the students to :

(1) - Receive information (e.g., listen to a lesson, a peer presentation, a video document, etc.)

(2) - Observe, imitate (e.g., a behavior, a natural phenomenon, practices of another person, etc.)

(3) - Practice, do exercises (e.g., do application exercises, practice/train a technical gesture, etc.)

(4) - Explore, document (e.g., interview an expert, do literature research, etc.)

(5) - experiment, solve problems (e. g., test hypotheses, do a case study, etc.)

(6) - Create, enhance (e.g. ,design a poster, a journal, a book, a synthesis, a prototype, etc.)

(7) - Debate, discuss (e.g., discuss regulations, compare ideas, argue, try to convince, etc.)

2 : The Final Works

The final production corresponds to what the students must achieve at the end of the learning session. Indeed, a goal-oriented learning session supports active learning and students' motivation.

This family contains 16 cards, which are examples of concrete productions that can be made by students.

The list is not exhaustive. Participants may feel free to propose variants.

In addition, it is possible that a learning session may require the completion of other concrete productions. Let the creativity of the participants run free!
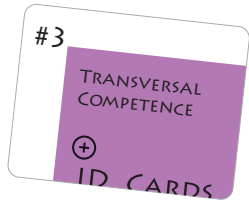
3 : The Transversal competencies

Beyond theoretical knowledge, students have to build and mobilize various transversal competencies. These competencies enable them to be, in the long term, autonomous in their learning and in their lives.

The learning session should support the implementation of at least one of these skills defined by UNESCO.

(1) - Critical thinking

(2) - Innovative thinking

(3) - Global citizenship (e.g., respect for diversity, intercultural understanding, tolerance, etc.)

(4) - Information & ICT literacy (e.g., locate and access information, analyse and evaluate media content , etc.)

(5) - Interpersonal skills (e.g., communication skills, organizational skills, teamwork, etc.)

(6) - Intrapersonal skills (e.g., motivation, self-managing of emotions, work, self-assessment, etc.)

The Area of Knowledge

Hydrogen energy questions several major areas of knowledge. The participants have to design a learning session in such a way that students can explore, discover and learn about the selected field in a way that respects the curriculum.

This family contains 9 cards formulated as keywords to inspire the participants. These keywords could find a place in different disciplinary fields (e.g. physics, chemistry, economics, social sciences, history, geography, etc.)

As for the #2 cards, the list is not exhaustive.

Allow participants to feel free to discuss the content to meet their teaching and learning needs, but also to take into account the curriculum as well as the resources available (e.g., documents, scientific knowledge on the subject, class time).

Workshop Guidelines

ID Cards

The **ID SESSION** should be organized and facilitated according to **CERTAIN PRINCIPLES** to ensure the **ACTIVE PARTICIPATION** of the stakeholders.

A **CENTRAL ROLE** is given to the **FACILITATOR** of the session who have to bring a group of people to seek their opinions, extract their knowledge and to solve problems in a collaborative and creative context.

The facilitator is an individual who enables the groups to work more effectively. She or he can also be a guide for learning or dialogue to help a group reflect deeply on its assumptions and systemic processes and context. (from Sam Kaner et al., 2007)

FACILITATOR

Facilitator's Roles

Ensure the...

Enrolment

4 to 8 participants,
including 2 teachers min.
for each session
+
Professional mixity

Organisation

Dates in accordance with
professional constriants
+
Friendly/neutral place

Animation

Respect of the participants,
of their proposals, of the duration
+
note-taking of the proposals,
digressions limitation

Finalisation

Enabling formating
+
document sharing
& ajustments

Avoid...

bringing together
colleagues with a
hierarchical relationship

the workplaces of the
participants

to respond in place
of participants

to let too much
time pass

The way in which the workshop will be implemented is very important here to ensure a **DIVERSITY OF INPUTS AND IDEAS**, and also to be **IN ACCORDANCE WITH THE VALUES** conveyed by energy-hydrogen in the society (e.g., clean energy, eco-friendly, represents the future and an innovative technology).

The **FACILITATOR** must therefore pay attention to :

(1) Enrolment :

The organization of the workshop should allow the exchange of knowledge to **INNOVATE AT SCHOOL** in order to make the themes of hydrogen energy motivating and attractive.

Thus, this requires **BRINGING TOGETHER** teachers, teacher trainers from different disciplines (physics, economics, history, etc.) and hydrogen-energy specialists from industry, research and/or civil society who are aware of the issue.

(2) Organization :

Ideally, the workshop should be held outside the participants' workplaces to help them break with their habits, and then to allow creativity. The **WORKSPACE** must be **USER-FRIENDLY**, functional and in accordance with **ECO-FRIENDLY** values (Third-place spaces are ideal for this purpose).

The room must be welcoming and **EQUIPPED WITH,** at least, :
- a large table, comfortable chairs allowing everyone to sit and see each other (ideally in a U-shaped or circular shape)
- the ID-cards game with the guide cards for participants
- a videoprojector and a computer, or an interactive whiteboard
- a whiteboard or a flipchart
- markers and post-it

When welcoming participants, **BRING COFFEE AND CAKES**, preferably organic and with recyclable cups, etc. This will facilitate conviviality and informal exchanges from the beginning of the workshop

ECO FRIENDLY
Lorem ipsum dolor sit amet, diam

(3) Animation :

Running participatory events involves an interesting balance of structure and creativity, planning and spontaneity.
The workshop must therefore follow a **CONTROLLED SCENARIO**, forming a framework conducive to synergy between the participants.

The total duration of the session is **4 HOURS MAX**.
You must guarantee the participants this timing.

The workshop is divided into **4 DISTINCT AND COMPLEMENTARY STEPS**.
Each one must therefore be put in place:

Step 1 (15 min.)	: User-friendly welcome and ice-breaking
Step 2 (15 min.)	: Introducing Hydrogen-energy and the workshop goals
Step 3 (2h00)	: ID workshop
Step 4 (15/30min.)	: Finalisation and futur works

Step 1 : User-friendly welcome and ice-breaking (15 min.)

Take 15 minutes to chat with a coffee, introduce yourself as a facilitator.
Be relaxed and give participants confidence.
Encourage everyone to introduce themselves.
Ask participants about their hobbies, personal interests.
Present the location and workspace.

tools to facilitate ice-breaking exist, do not hesitate to use them if necessary

Invite the participant to settle down in order to work together when you feel that the participants :
- have met each other informally
- are comfortable

but don't let them wait !!

Step 2 : Introducing Hydrogen-energy and the workshop goals (15 min.)

Those 15 minutes aims at :
- presenting in a few words what hydrogen-energy is, its main applications and current developments.
- Use a powerpoint specially designed for this purpose. The latter must be simple and accessible to all.
- Let stakeholders ask all the questions and comments they have.

- present the objectives of the workshop, i.e. to design a learning program together
- Indicate that the quality of what will be produced depends on the sharing of knowledge by everyone and therefore on their active participation.
- Distribute the participant guide sheets and ask if they have any questions or comments

It is common for some people to feel uncomfortable with the subject (hydrogen-energy) or competent in instructional design.
- Indicate that this is why the group brings together complementary skills.
- Add that they will be guided by you and the card game

Participants' Rules

think, act as
be, a/an ...

Conceptor

Have confidence in your
creative abilities
Start with what requires your
attention
Take this opportunity to
participate in change

Novice

Give yourself the right to learn
Have desire to discover
Accept the possibility of not having
the "right" answer
Have confidence in
your ability to find one

Optimist

Think first, "What can I do? »
rather than "What's wrong?"
Be insatiable
Believe in the possibility of
creating together

Curious

Break the routine
Inspire yourself from the
outside world to your habits
Be inspired by others.

...

Respect the other participants, of their proposals
& feel free to participate !

Step 3 : The ID workshop (2h00)

- Present the card game
- Read or have read the rules of the game

- Have 4 cards (one per family) chosen by 4 different participants

- Start brainstorming
- Guide the participant through the 5 moments of the participatory design process

. Goals .
Rapidly generate innovative pedagogical solutions
on the theme of hydrogen energy

. Principles .
All you have to do is draw 1 card from the 4 card families :

1 : Learning event
3 : Transversal Comp.

2 : Final work
4 : Knowledge on hydrogen energy

Each selected element corresponds to what the students will have to mobilize

It is imperative to integrate the imposed elements in
the design of the learning session or sequence
However, you are allow to change one of your cards if necessary

Duration
2h

Participants
4 to 8
including 2 teachers min.

ID CARDS

ID Process

COMMUNICATE

UNDERSTAND

EVALUATE

DEFINE

PROTOTYPE

IDEATE

1
Cards Selection and collective exchange on their meaning

2
Mind mapping of the first pedagogical ideas

3
Proposal of learning goals
+
related activities

4
Analysis of proposals
+
selections, modifications and temporal organization of the different sessions

5
Collective validation & final formating

2H
OF
CARD-BASED
WORKSHOP

go back and forth, it's not a linear process !

Step 3 : The ID workshop (2h00)

1- Card selection and collective exchange on their meaning (10min. max)
- Ask the participant on what they understand about each cards selected
- Note their firts proposal
- Give them the details sheet presenting each familly of cards if needed

2-Mind mapping of the first pedagogical ideas (20min. max)
- **START THE BRAINSTORM BY THE BLUE CARD** = the hydrogen-energy topic
- Allow 5 min. for individual reflection (each participant could write down their ideas on several post-its)
- Record the ideas and related content on the board
- Group them by proximity
- **ASK PARTICIPANTS REGULARLY TO CONFIRM YOUR NOTES**
- Establish the mental map of ideas
- Take a picture, copy it to your computer and project it there, or post the sheet next to the flipchart.

During all the process, the facilitator's mission is to support everyone to do their best thinking.
This mission is enacted by the facilitator's four functions:
- encouraging full participation
- promoting mutual understanding
- fostering inclusive solutions
- cultivating shared responsibility

Well done!

3- Proposal of learning goals + related activities

- On the basis of the mental map, ask the participant to define a central learning content.

- From this content, ask the questions:

**«HOW TO MAKE THIS SUBJECT LEARN WHILE TAKING INTO ACCOUNT THE CONSTRAINTS GIVEN BY CARDS #1, #2, AND #3?»**
«WHAT WOULD BE THE MOST FAVOURABLE ACTIVITIES IN YOUR OPINION?»

- Allow free discussion, let the participant diverged
- Note the proposals also by group of ideas

Ideate

an ideation design process requires participants to first diverge in order to converge on a new and innovative solution
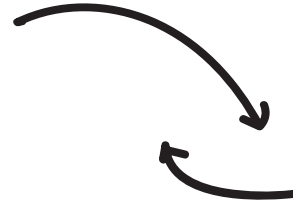
- Identify the moment when the group starts going around in circles. Group members can be repetitive, hesitant, sometimes contradictory or even defensive. This can be destabilizing. However, members of a group must struggle to integrate new ways of thinking that are different from their own.

As defined by Sam Kaner et al (2007), they are then in the «groan zone».
Sometimes, simply recognizing the existence of a groan area can be an important step for a group.

go back and forth,
it's n ot a linear
process !

New topic

DIVERGENT
ZONE

GROAN
ZONE

CONVERGENT
ZONE

Decisio
point

Time

Pr ototype

Diamond of Participatory Decision-Making
(from Sam Kaner et al, 2007)
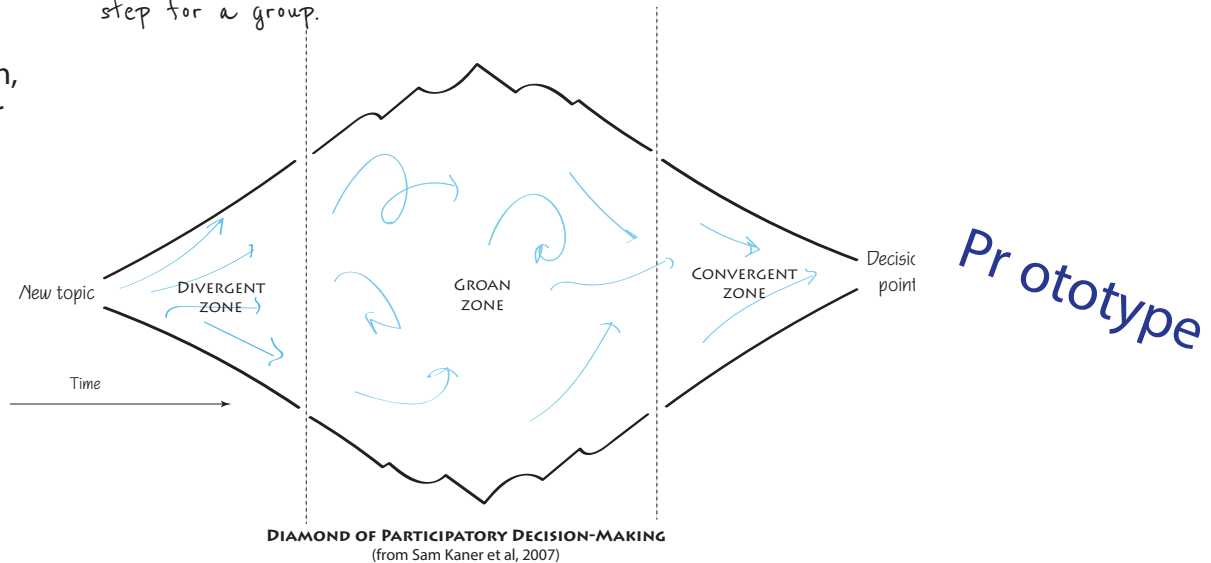
4- Analyse and structuration of the proposals

Ideate

- Help the participant to converge
- Summaryze all the proposals on the whitboard and ask them to confirme and/or summaryze by themself
- as previously take a picture of it, copy it to your computer and project it there, or post the sheet next to the flipchart.

- Refocus the proposals by introducing the pedagogical design sheet to be completed
- Based on this new information, ask them to make choises and synthetized their ideas in order to be able to complete this sheet.

- Note new proposals on the whiteboard following the sections of the document
- Help participants to make the back and forth between the different mind maps and notes taken previously.

Prototype

DESIGN CONSTRAINTS

#1 Learning event :

#2 Final wok :

#3 transversal comp. :

Hydrogen energy topic:

INSTRUCTIONAL DESIGN   Curriculum area:

Learning Goals :

Learning level :

Learning sequence tittle :

Pedagogical learning model :

learning steps	Description	Learning modality	material and support to provide	Learning assessment	
				trans. comp.	knowledge

NOTES:

5- Collective validation & final formating

- Summaryze the final proposal of the group on the whitboard and ask them to confirme and/or modify by themself
- Ask a participant, helped by the other, to fill in the proposed educational sequence form.

Evaluate

Economy & Social sciences

K+16

Learning Goal:
Understanding the sustainability of hydrogen energy **production** (including social acceptability)

Student work modality:
Group of 4/5 students regulated by specific roles within the group
+ Problem-based learning
+ 2 groups by pillar of the sustainable development (human, environment, economy)

Sequence of learning Activities:

Discovery of the topic & problem setting
- Video watching
- Manipulation of an experimental set-up etc...

Documentary research & 1st selection

Analysis of the relevance of the documents + contents based on a gride & Information sorting

Organization of a moving debate

Collective presentations of the group works & Teacher synthesis

Creation of a synthetic overview in a free format (e.g., mind maps, poster, short video...)

and of questionnaires to assess the perceptions of other students

sessions for a short learning sequence

sessions for a complete sequence

★ Assessment of knowledge and progress
★ Transversal skill mobilization : media/information literacy

(4) Finalisation :

The last facilitator's job relies of shaping collective production in such a way that it is :
- representative of the exchanges and proposals formulated
- understandable to any person

This step should be performed shortly after the session to avoid forgetting elements and to be able to quickly distribute it to participants for validation.

The document finalized can then be shared!

This method was developped by
Stéphanie Fleck - Associated Professor (France)

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ID Cards