

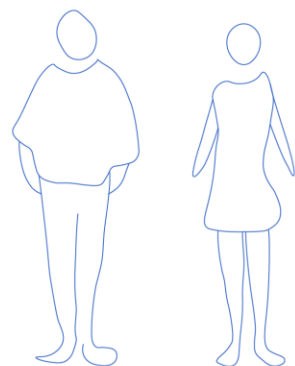
# Learning designs for developing Open Data competencies in elementary school

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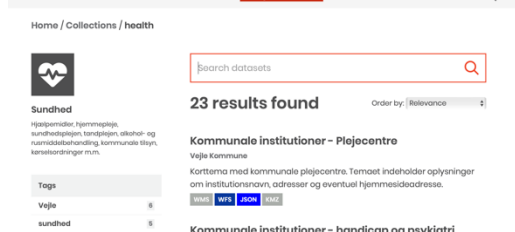
EGOV 2024

# Problem: Lack of skills

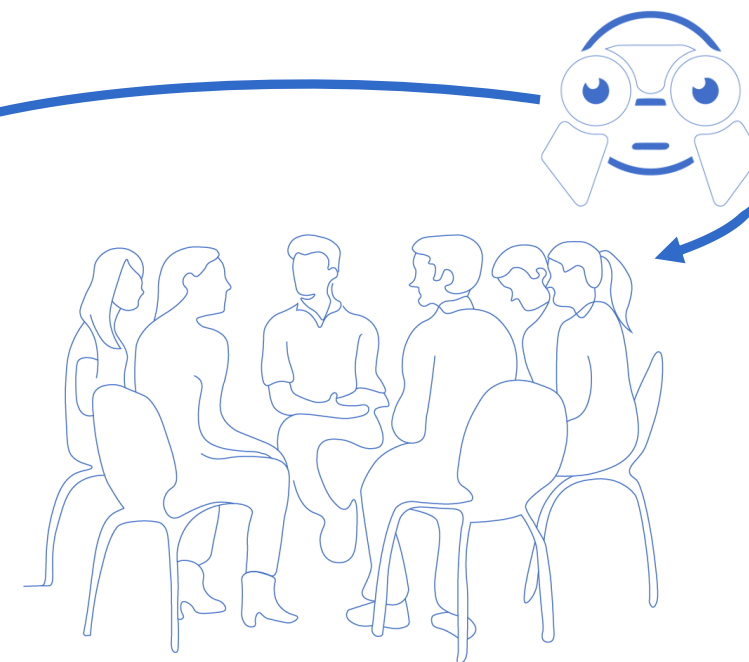


39	State-gov	177038	Bachelors	13	Never married	Adult-clerical	Not in family	White	Male	2374	0	40	United States
36	Self-emp-inc	63331	Bachelors	13	Married-civ-spouse	Exec-managerial	Married	White	Male	0	0	33	United States
30	Private	233846	HLS-grad	9	Divorced	Healthcare-pract	Not in family	White	Male	0	0	40	United States
53	Private	234723	LHS	7	Married-civ-spouse	Healthcare-pract	Married	Black	Male	0	0	40	United States
28	Private	338409	Bachelors	12	Married-civ-spouse	Prof-specialty	White	Black	Female	0	0	40	United States
37	Private	264562	Masters	14	Married-civ-spouse	Exec-managerial	White	White	Female	0	0	40	United States
49	Private	262337	HS	5	Married-spouse-absent	Other service	Not in family	Black	Female	0	0	34	Jamaica
52	Self-emp-inc	209642	HLS-grad	9	Married-civ-spouse	Exec-managerial	Married	White	Male	0	0	40	United States
31	Private	437761	Masters	14	Never married	Prof-specialty	Not in family	White	Female	14034	0	50	United States
42	Private	376449	Bachelors	12	Married-civ-spouse	Exec-managerial	Married	White	Male	5179	0	40	United States
37	Private	280464	Some college	10	Married-civ-spouse	Exec-managerial	Married	Black	Male	0	0	40	United States
30	State-gov	143297	Bachelors	12	Married-civ-spouse	Prof-specialty	Married	Asian Pac Islander	Male	0	0	40	United States
23	Private	122272	Bachelors	13	Never married	Adult-clerical	Own-child	White	Female	0	0	30	United States
32	Private	202039	Assoc-degree	12	Never married	Sales	Not in family	Black	Male	0	0	30	United States
40	Private	123772	Assoc-voc	10	Married-civ-spouse	Craft-repair	Married	Asian Pac Islander	Male	0	0	40	United States
34	Private	345487	HS-BS	4	Married-civ-spouse	Transport-moving	Married	Asian Indian Latino	Male	0	0	40	United States
25	Self-emp-inc	174706	HLS-grad	9	Never married	Farming-fishing	Own-child	White	Male	0	0	30	United States
32	Private	186424	HLS-grad	9	Never married	Machine-op-mgmt	Unmarried	White	Male	0	0	40	United States
38	Private	23807	LHS	7	Married-civ-spouse	Sales	Married	White	Male	0	0	30	United States
42	Self-emp-inc	202175	Masters	14	Divorced	Exec-managerial	Unmarried	White	Female	0	0	40	United States
40	Private	332324	Doctorate	16	Married-civ-spouse	Prof-specialty	Married	White	Male	0	0	40	United States
54	Private	302346	HLS-grad	9	Separated	Other service	Unmarried	Black	Female	0	0	20	United States
25	Frederburg	78645	HS	5	Married-civ-spouse	Farming-fishing	Married	Black	Male	0	0	40	United States
43	Private	121707	LHS	7	Married-civ-spouse	Transport-moving	Married	White	Male	0	0	40	United States
59	Private	108035	HLS-grad	9	Divorced	Tech-support	Unmarried	White	Female	0	0	40	United States

```
1 requests = requests.get(url)
2 # checking response.status_code (if you get 502, try retreating the url)
3 if response.status_code != 200:
4     print(f"Status: {response.status_code} - Try retreating the url")
5 else:
6     print(f"Status: {response.status_code}\n")
7 # using BeautifulSoup to parse the response object
8 soup = BeautifulSoup(response.content, "html.parser")
```



Lack of skills for participating in OD ecosystems (accessing, understanding and using OD)



Elementary Schools  
Generation of OD literate citizens

# Aim of the study

Developing learning designs for OD competencies in elementary school

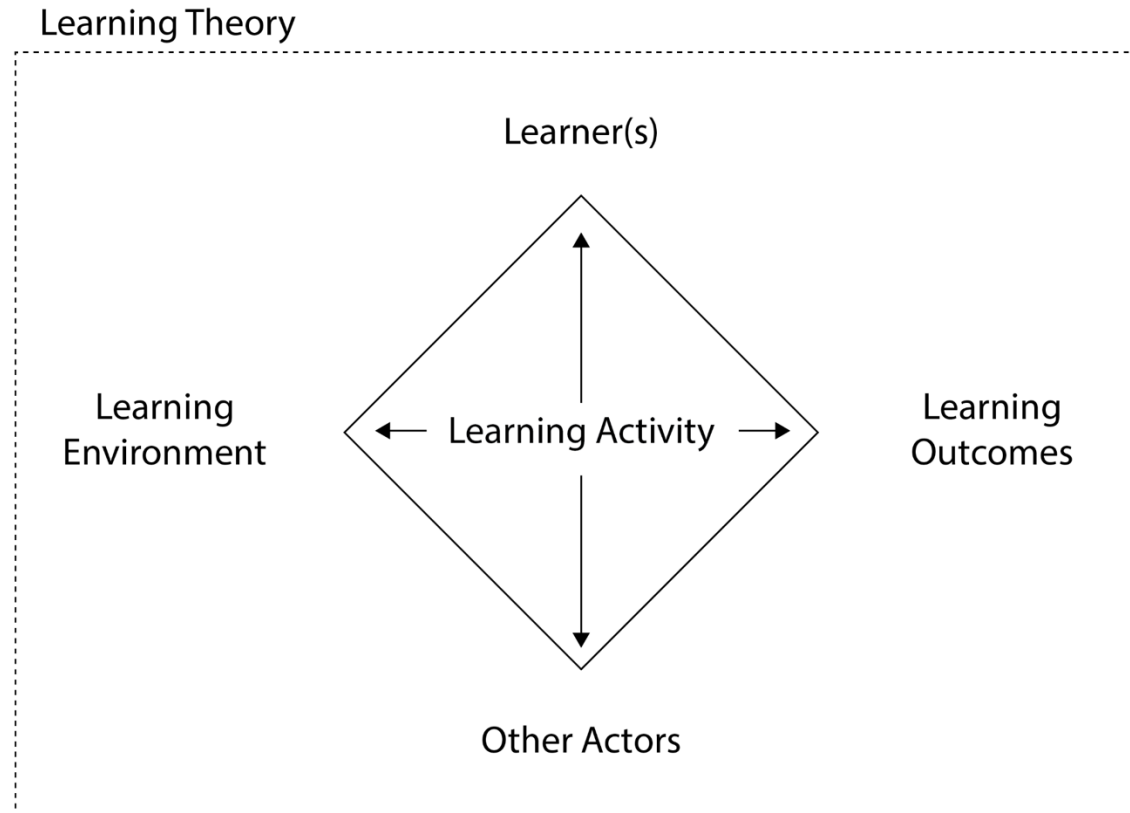


Enabling young people as active actors in OD Ecosystems

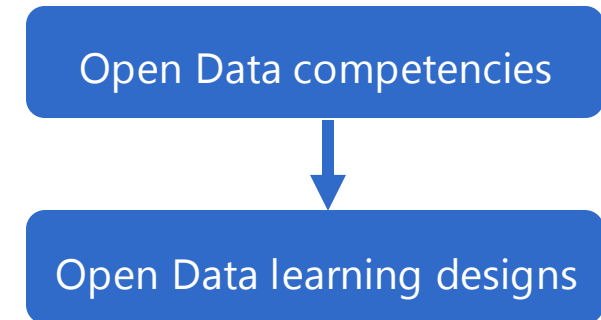
How learning designs for building Open Data competencies in elementary school can be developed?

What educational design elements are relevant?

# Learning designs

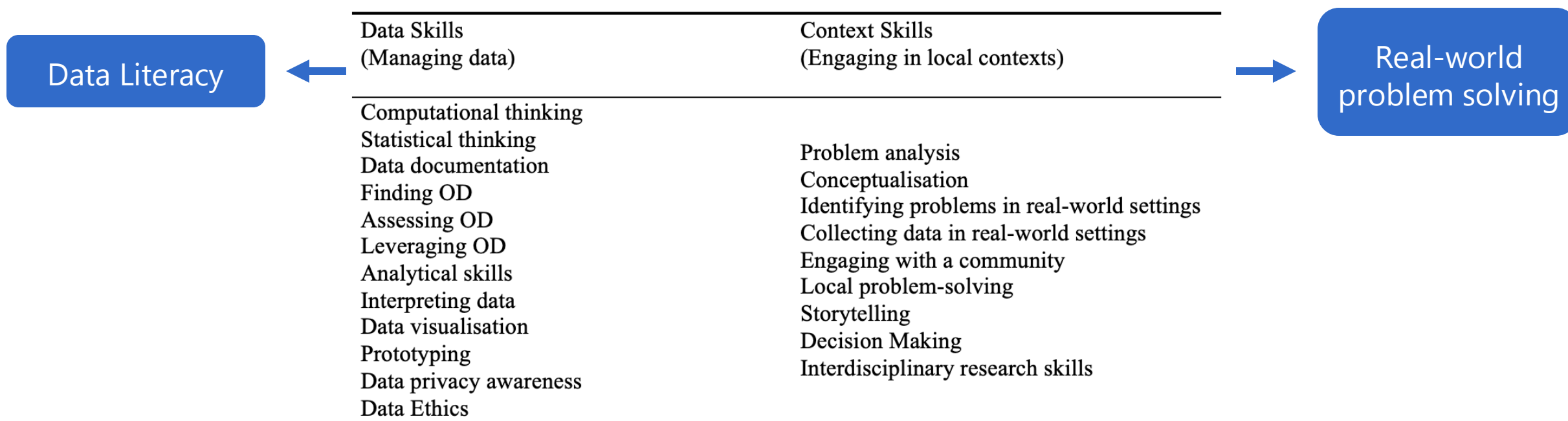


Beetham's Learning Design approach. Adapted from Beetham (2007).



# Previous review on Open Data skills

**Table 1.** OD Skills from Celis Vargas (2023)



# Data Literacy and Real-world problem solving

**Table 2.** OD Competencies and skills in elementary school based on DL and RWPS

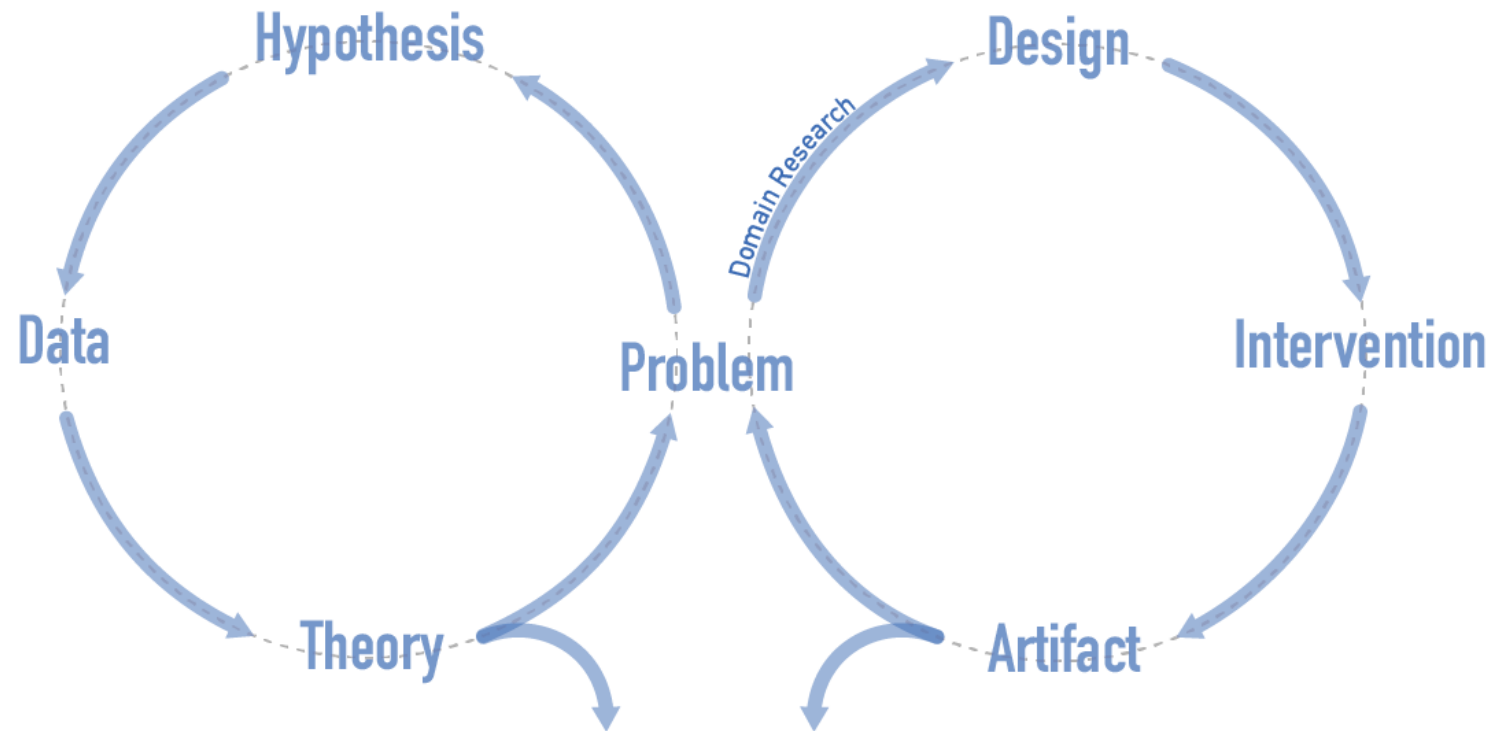
Learning outcome	OD competencies	Skills/abilities from Data Literacy	Skills/abilities from Real work problem-solving
Real-world problem-solving with open data	Getting data	Access and find data. Collect own data	
	Handling data	Read, Work with, Use, Manage, Manipulate, Navigate, Clean	
	Understanding data	Analyse, Comprehend, Interpret, critically assess, Understand underlying principles and challenges of data, Critique, Ethically use	Identifying and defining Authentic problems and significant questions. Make connections between information and arguments.
	Making decisions with data	Select, Observe, Evaluate, Reflect, Explore alternative solutions	
	Communicating with data	Visualise, Support Arguments, Present, Communicate stories	

# Learning approaches to Data Literacy and Real-world problem solving

**Table 3.** Characteristics of learning designs for DL and RWPS in elementary school

Characteristic	What was considered
Authenticity	Real problems, real-world settings, real data, real activity
Situated context	Students' context, students' experience
Interdisciplinarity	Cross-curricular subject (Quantitative and Qualitative)
Tools	Technological tools for processing data

# Methodology: Design-based research



Osmotic DBR model. Ejersbo et al. (2008)



# Intervention in Danish school

**Table 4.** Methods and participants

DBR phase	Method	Participants
Problem definition: domain research	Semi-structured interview 60 min	5 teachers in 9th-grade
Intervention	Test of OD educational design 2 hours	39 students in 9th-grade (3 groups of 13 students) 2 facilitators
	Qualitative survey	37 students
	Focus group interview	15 students

# Testing an Open Data learning design

School project "Utopia Island"



Definition of the health system

Inquiry-based



How many doctors need their island per person and what kind of medical specialties (e.g., cardiology, paediatrics, dermatology)?

Gamified hands-on



Play as policy makers

Goal: Create a data story, create arguments with data

Exploring data



Create a solution  
(visualization and data stories)



Presenting



# Results: Main elements

**Table 5. Results**

Theme	Sub-theme
Competencies and skills	Finding the right, relevant and useful data (T+S) Connecting data to make a good conclusion or solution (T+S) Being critical, creating arguments and discussing with the data (T) Seeing a problem (T) Answering questions (S) Drawing a story (S)
Interesting and engaging activity	Active and playful (T+S) Having a meaningful outcome (T+S) Involving students personally in a problem (T) Connecting to students' interests and daily life (T) Challenging but also fun (S) Gives freedom, students not listening but doing themselves (S)
Authentic activity, more than an assignment	Meaning of analysing data in solving real problems (T+S) Helping/involving the community around (T+S) Bringing in experts from the outside world (T) Students being proud of their work (T) Students being heard and sharing ideas with others (S)

# Competencies and skills

Theme	Sub-theme
Competencies and skills	Finding the right, relevant and useful data (T+S)
	Connecting data to make a good conclusion or solution (T+S)
	Being critical, creating arguments and discussing with the data (T)
	Seeing a problem (T)
	Answering questions (S)
	Drawing a story (S)



Learning outcomes: focus on analysing a problem with data, being better at arguing with data

*"how to look in data and learn the analysis paths of it and analysing a lot of data to make a solution or make a good conclusion" teacher*

# Interesting and engaging activity

Theme	Sub-theme
Interesting and engaging activity	Active and playful (T+S)
	Having a meaningful outcome (T+S)
	Involving students personally in a problem (T)
	Connecting to students' interests and daily life (T)
	Challenging but also fun (S)
	Gives freedom, students not listening but doing themselves (S)



Learning approach: facing a problem that could happen in real life

*"I think students need to get involved personally", "global problems might feel distant or abstract to young pupils" teachers*

*"you just don't sit down and listen to the teacher but do most yourself. You have to figure something out on your own and then have to share it with your group" Student during focus group*

# Authentic activity

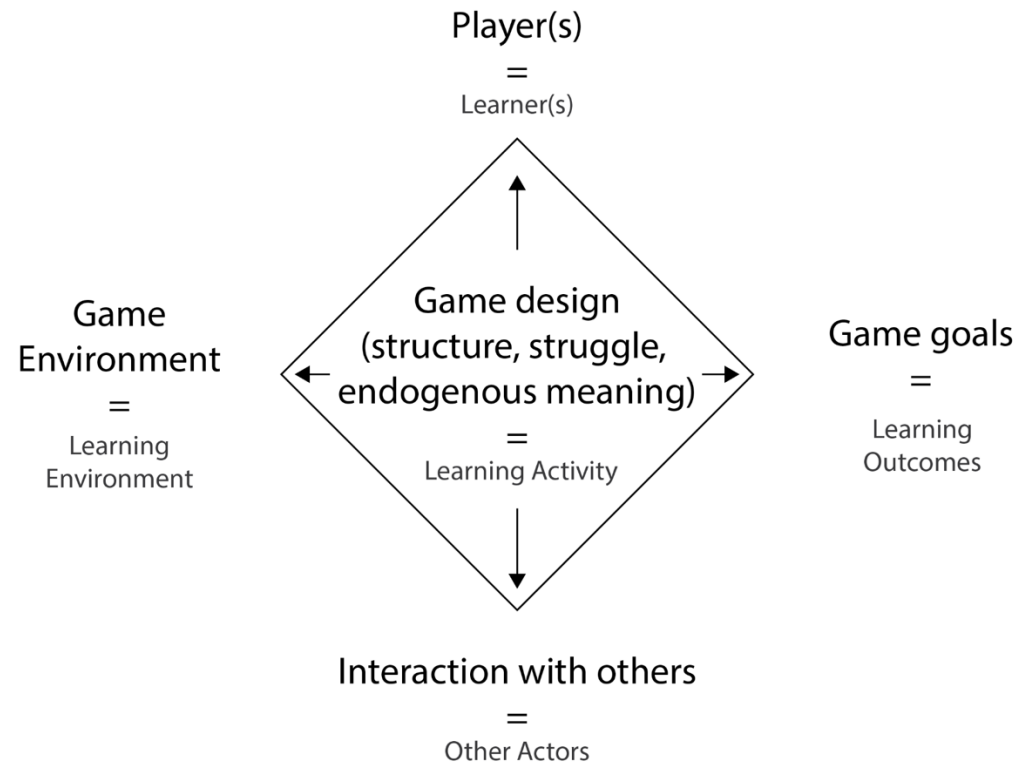
Theme	Sub-theme
Authentic activity, more than an assignment	Meaning of analysing data in solving real problems (T+S)
	Helping/involving the community around (T+S)
	Bringing in experts from the outside world (T)
	Students being proud of their work (T)
	Students being heard and sharing ideas with others (S)

Learning activity: more than an assignment

*"I don't think they will see the meaning in analysing data just to solve a school-made problem, they can see the meaning of analysing data and use it to solve some problems" teachers*



# Developing Open Data learning in elementary school: a parallel between learning design and game design



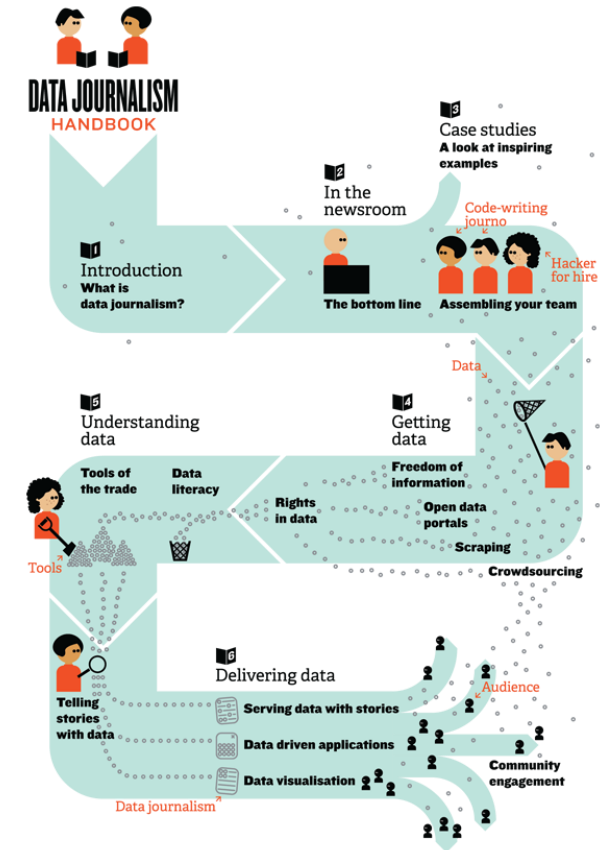
Parallel between Beetham's Learning Design approach and Costikyan's game design approach. Adapted from Beetham (2007) and Costikyans (2002)



# A game-based learning design for building Open Data competencies in elementary school

An educational game grounded in two authentic elements:

1. In the game the students act as data journalists engaging in a simulation of an authentic OD process.  
*Getting, understanding, and delivering data to explain a mysterious event to the community*
2. The game develops around a mystery which is relevant for students and close to a real-world complex challenge.  
*Solving an environmental mystery that uses Open Government Data*





# Thank you for your attention

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