

# *Investigating middle school students' and teachers' transition towards innovative practices in a modern learning space*

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**THE FAST MOVING WORLD  
PRESSURES THE EDUCATION SYSTEM  
THE NEED TO PERFORM**

The background of the slide is a complex, abstract digital visualization. It features a dark blue to black gradient. Overlaid on this are numerous thin, glowing lines in shades of cyan and light blue, some straight and some curved, creating a sense of motion and connectivity. Interspersed among these lines are clusters of small, bright blue and white particles, resembling data points or a network. There are also some faint, larger-scale patterns that look like stylized orbits or paths. The overall aesthetic is futuristic and high-tech, suggesting themes of technology, data, and rapid change.



**Automation** has transformed **processes and cultures of productivity** in order to perform globally

– Lorenz & al. (2015)



#### BIG-DATA-DRIVEN QUALITY CONTROL

Algorithms based on historical data identify quality issues and reduce product failures



#### ROBOT-ASSISTED PRODUCTION

Flexible, humanoid robots perform other operations such as assembly and packaging



#### SELF-DRIVING LOGISTICS VEHICLES

Fully automated transportation systems navigate intelligently within the factory



#### PRODUCTION LINE SIMULATION

Novel software enables assembly line simulation and optimization



#### SMART SUPPLY NETWORK

Monitoring of an entire supply network allows for better supply decisions



#### PREDICTIVE MAINTENANCE

Remote monitoring of equipment permits repair prior to breakdown



#### MACHINES AS A SERVICE

Manufacturers sell a service, including maintenance, rather than a machine



#### SELF-ORGANIZING PRODUCTION

Automatically coordinated machines optimize their utilization and output



#### ADDITIVE MANUFACTURING OF COMPLEX PARTS

3-D printers create complex parts in one step, making assembly redundant



#### AUGMENTED WORK, MAINTENANCE, AND SERVICE

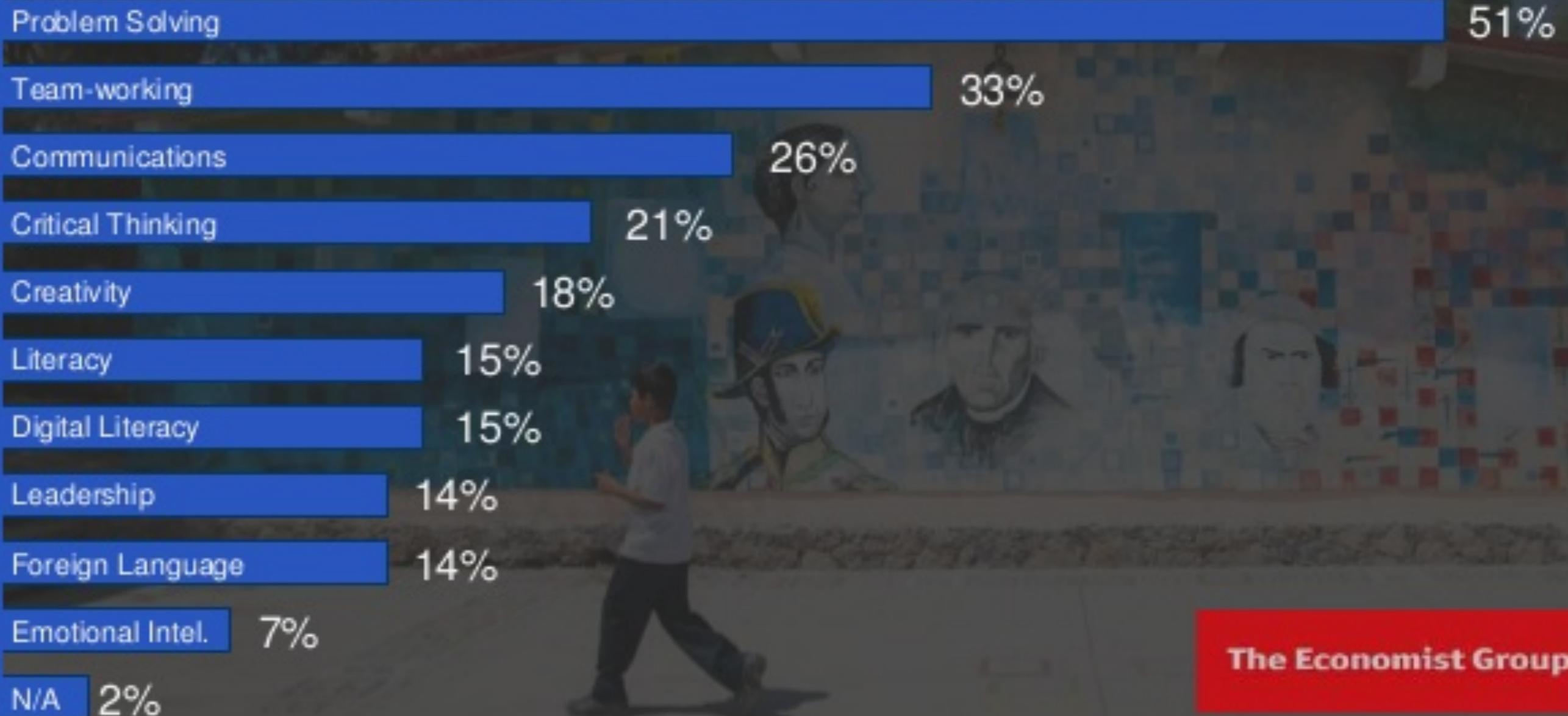
Fourth dimension facilitates operating guidance, remote assistance, and documentation

# Economist Intelligence Unit (2015)

Driving the Skill Agenda: Preparing Students for the Future

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## Top Skills Currently Needed in the Workplace



The need to solve today's **complex problems** gives rise to new types of **workspaces**, new **approaches** and new forms of thinking, such as **computational thinking (CT)**



**We began a multi-stage study that aims to better understand the relationship between space agency and the development of skills (CT) required by the innovative society.**

**First stage (2017-2019): a case study focusing on computational thinking and characteristics of new learning spaces (Chiasson, 2019)**

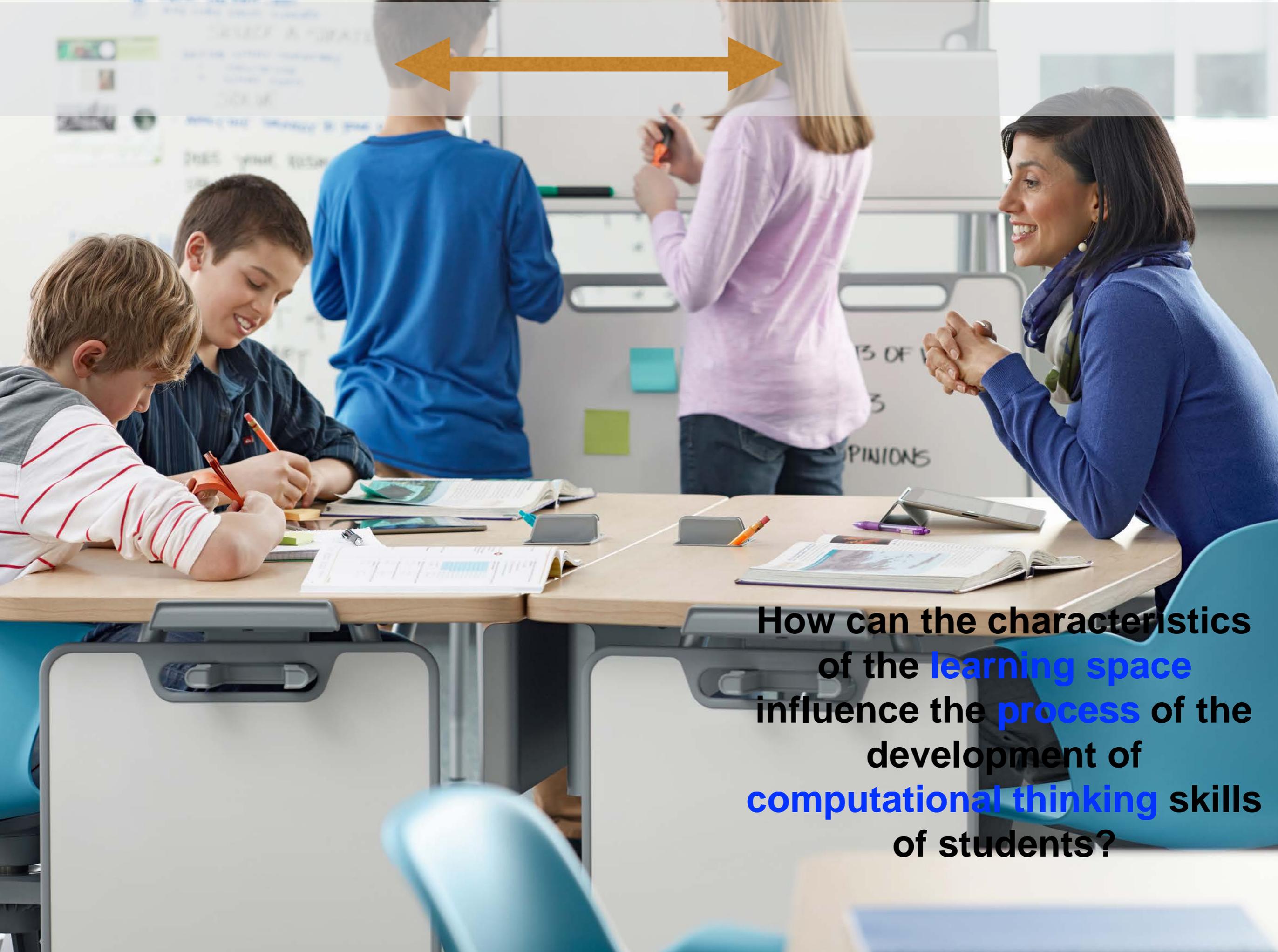


# Computational Thinking

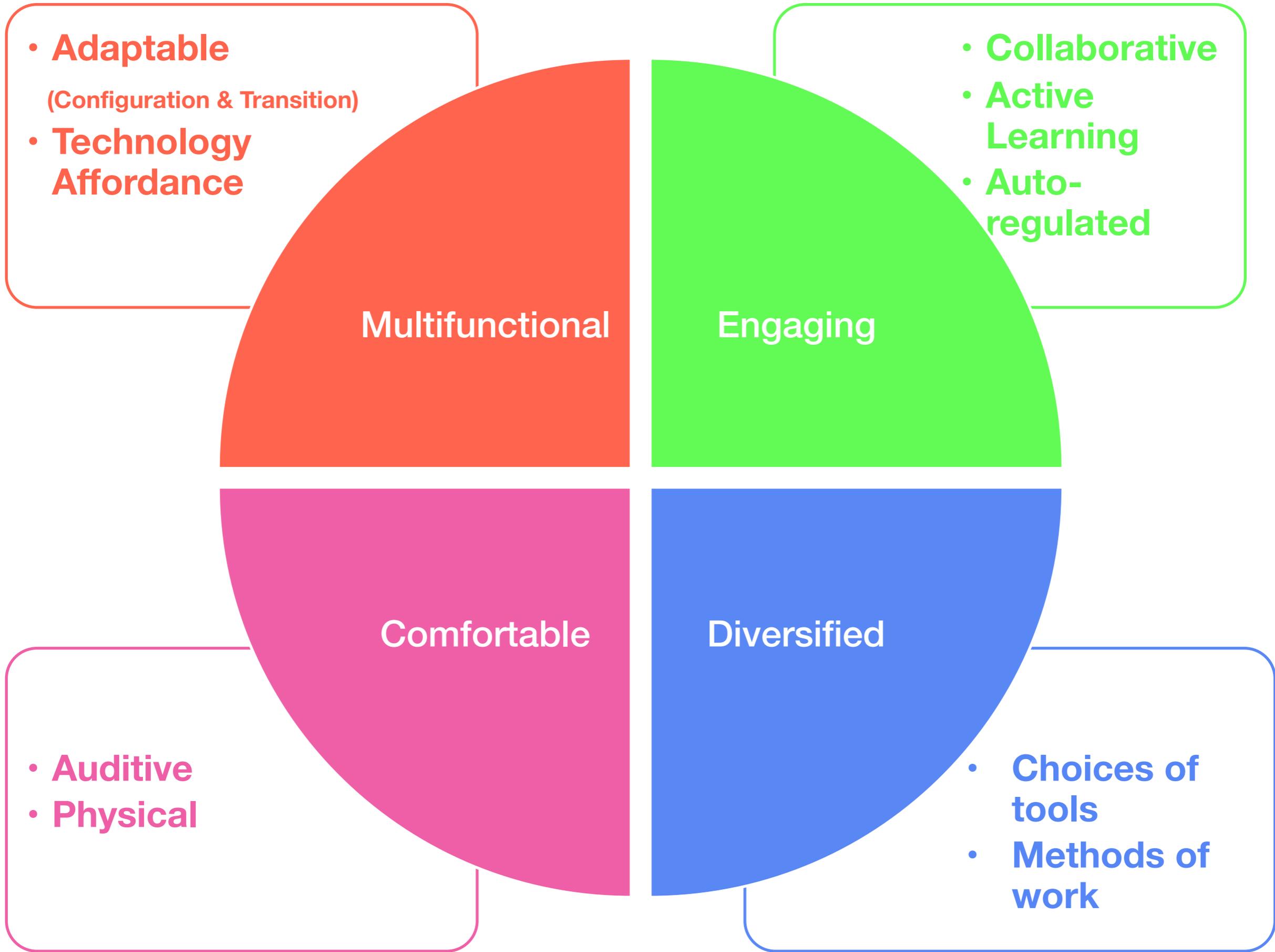
According to the authors:

- It is a real skill of the 21st century.
- Is what comes before any computing technology.
- Is the thought **process** involved in **formulating a problem** and **expressing its solution** in a way that a computer, human or machine can effectively carry out.

(Ambrosio, Macedo, Almeida, Franco, 2014; Barr et Stephenson, 2011; Brennan & Resnick, 2012; Bers, Flannery, Kazakoff, Sullivan, 2014; Bundy, 2007; Shailaja & Sridaran, 2015; Wing, 2006)



How can the characteristics of the **learning space** influence the **process** of the development of **computational thinking** skills of students?



# Innovate

(Creating & Designing)

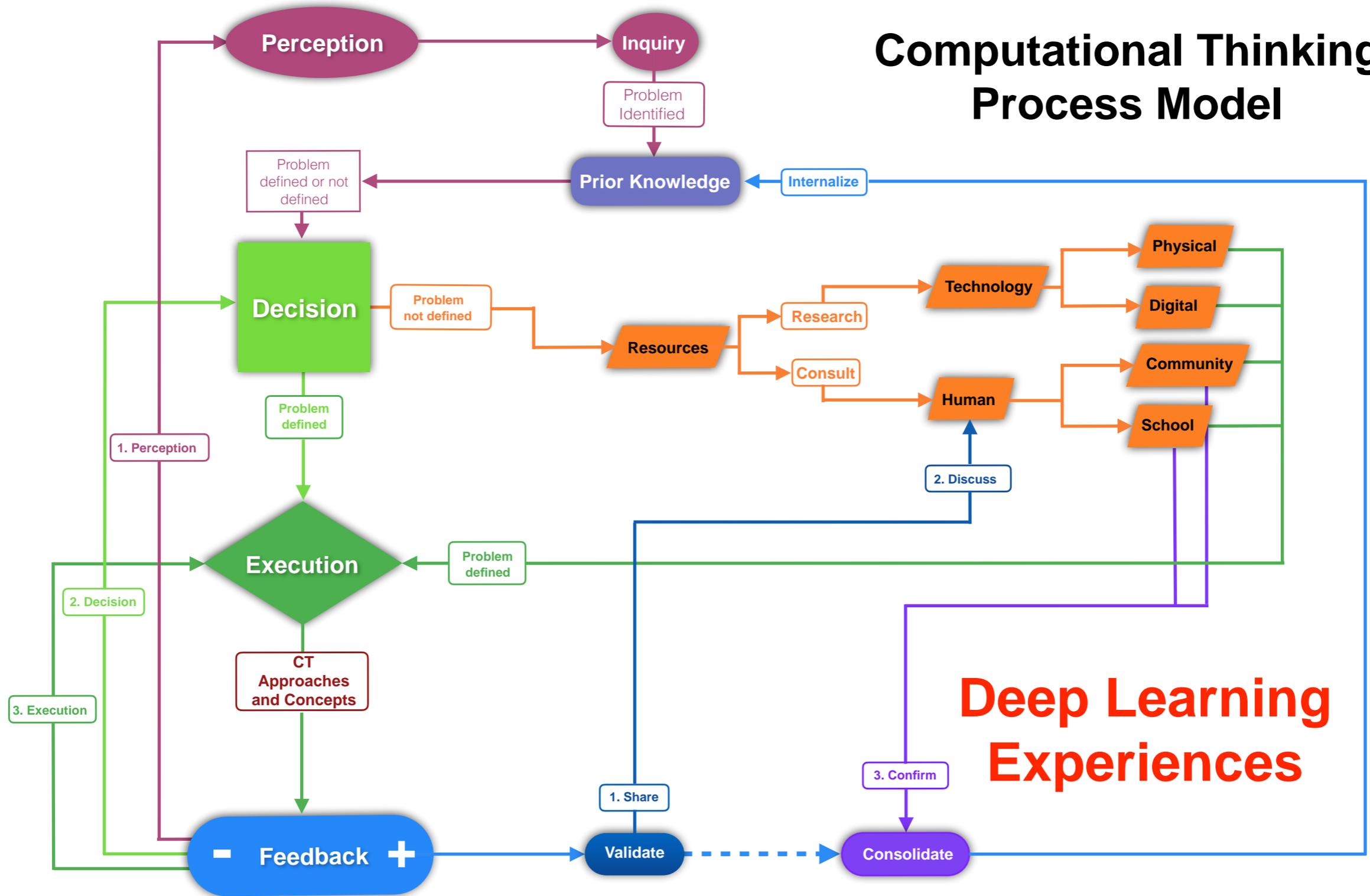
# Validate

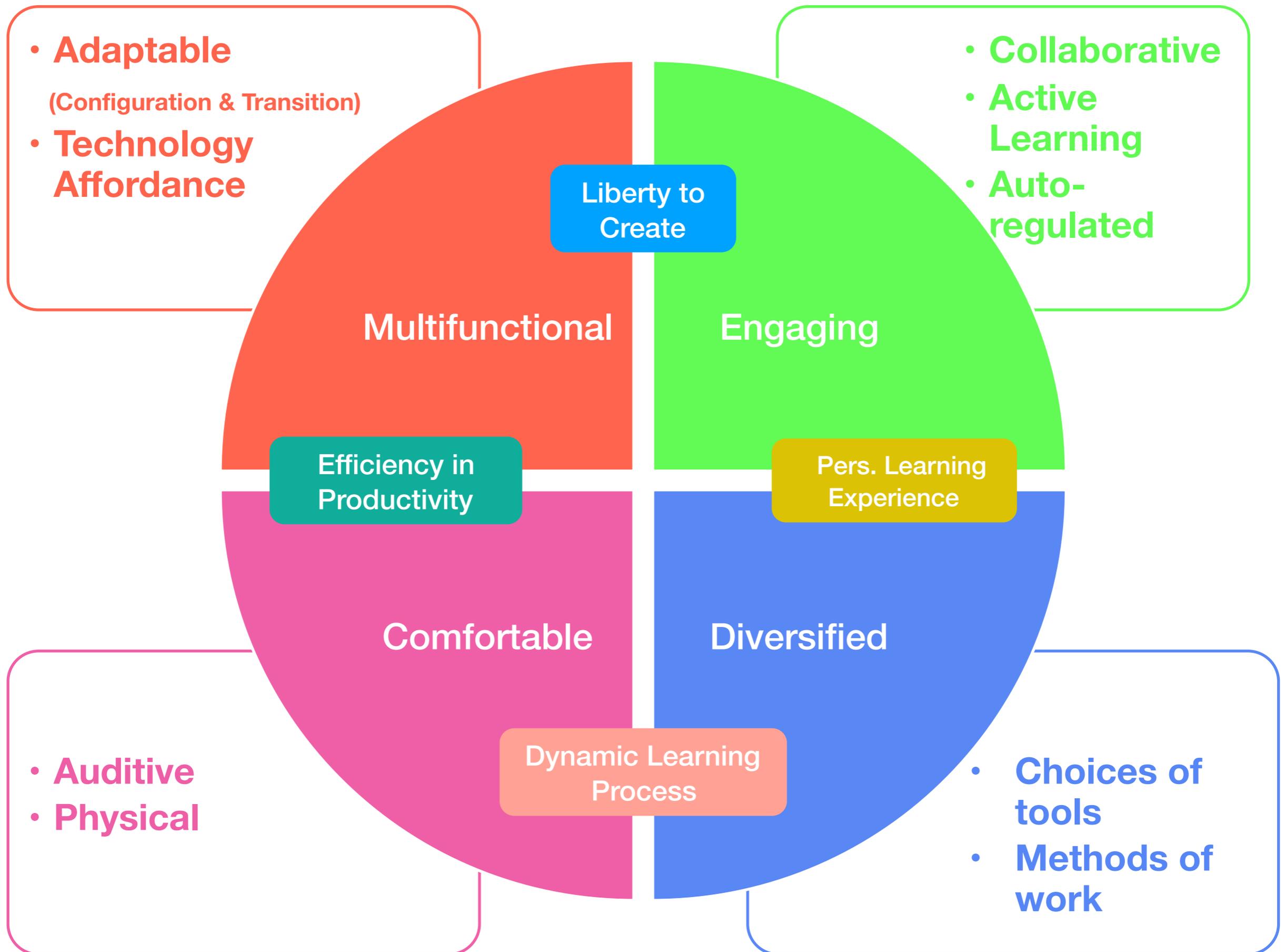
(Experimenting & Sharing)

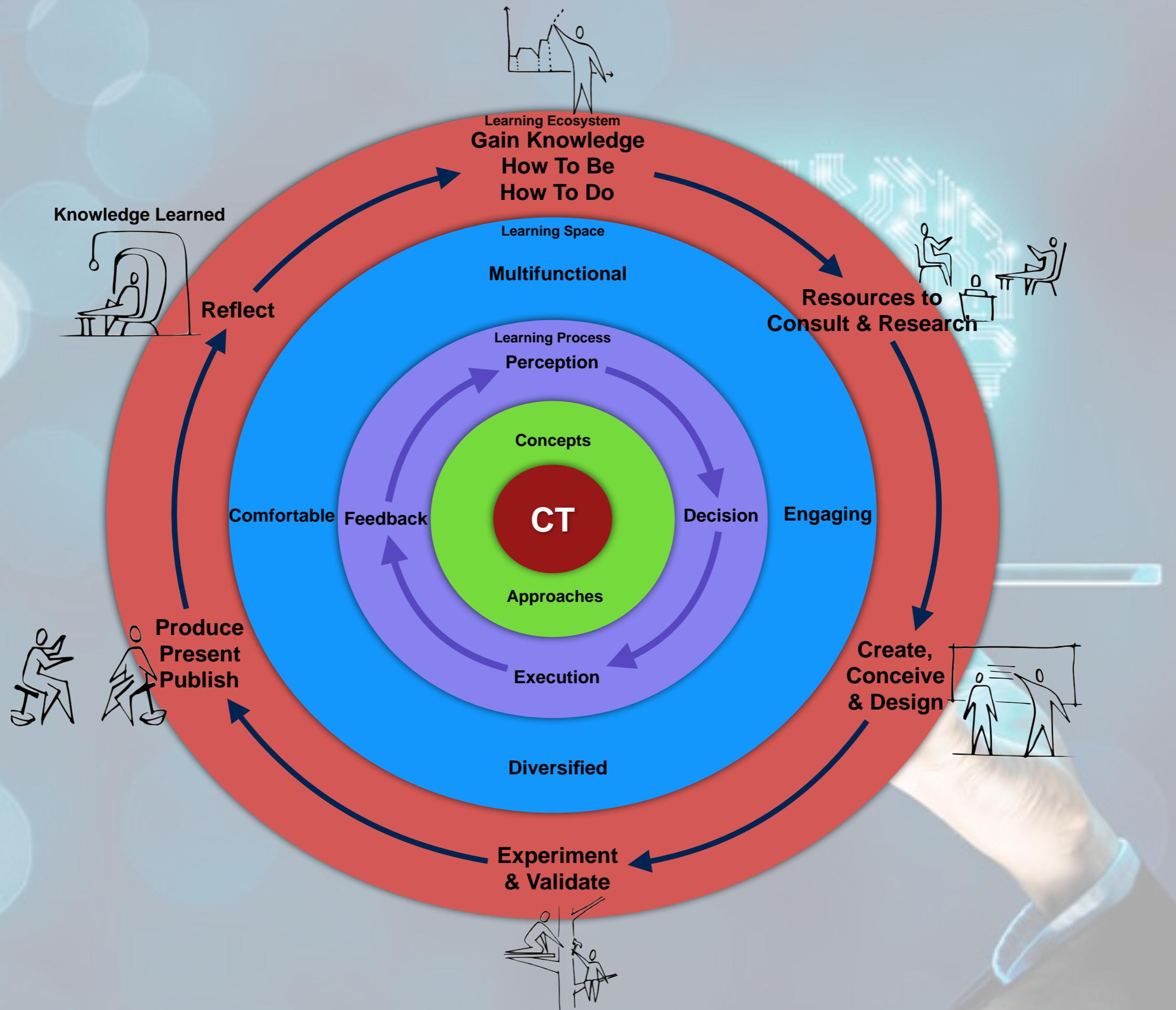
# Reflect

(Collaborating & Presenting)

## Computational Thinking Process Model







Second stage (2019-2020): focusing on teachers and teaching practices in a new space

**How do teachers embrace a new learning environment?**

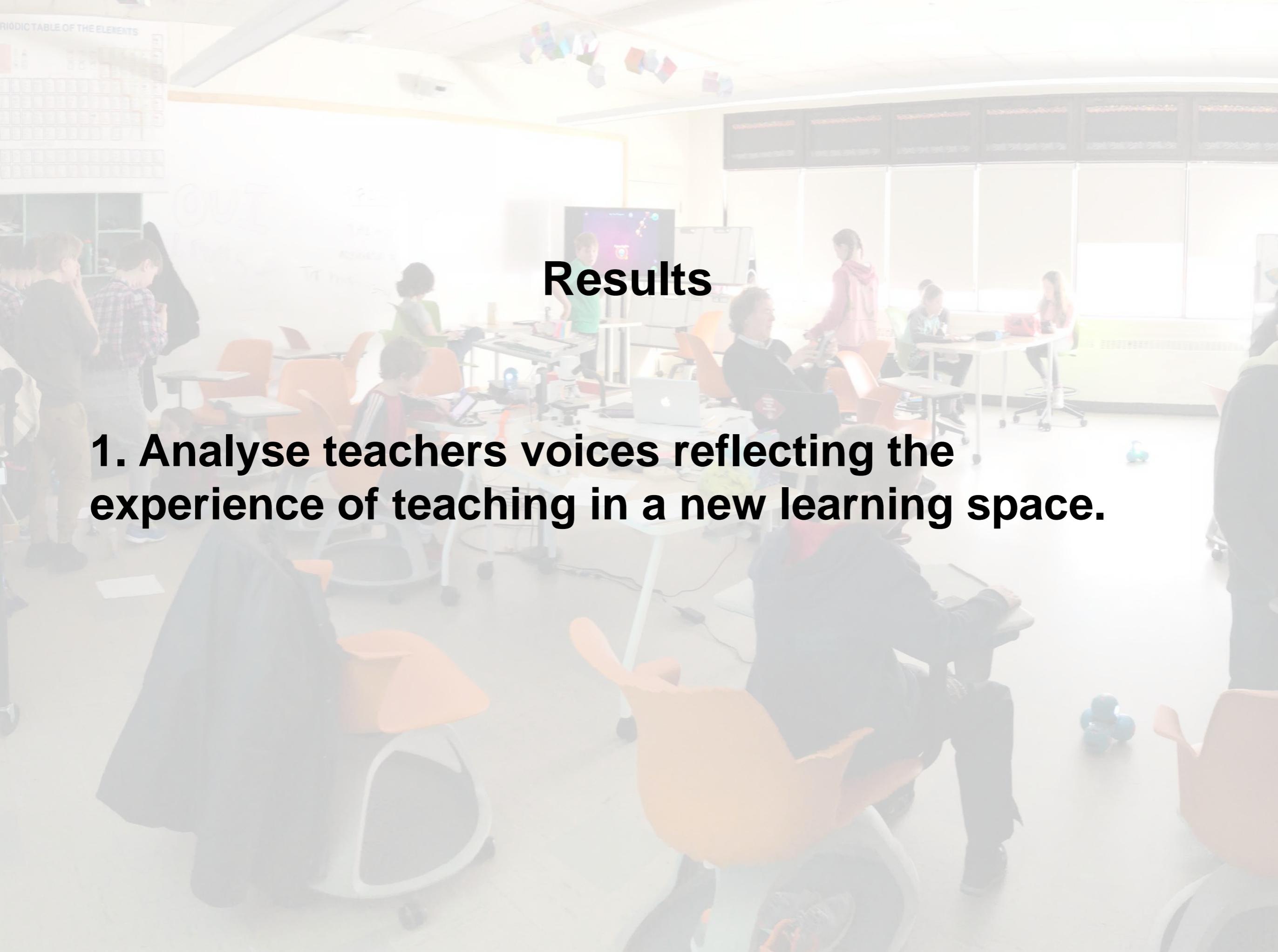


# Research Objectives

- 1 - Analyse teachers voices reflecting the experience of teaching in a new learning space.**
- 2 - Identify patterns and issues that emerge during the transition period.**

# Data Collection

- 3 Non-directed interviews with teachers (Gagnon, 2012)
- Explanatory interview technique (Gagnon, 2012; Vermersh, 1994)
- Classroom observation with screenshots and video captures (Royer, Guillemette & Moreau, 2005)
- Journal of the researcher (Peretz, 2004)

A modern classroom setting with students and teachers. The room features orange chairs, white tables, and a large whiteboard. A periodic table of elements is visible on the wall. The text "Results" is overlaid in the center.

## Results

**1. Analyse teachers voices reflecting the experience of teaching in a new learning space.**

*Excited!*

“Just like the students, I absolutely love the new classroom, new look, the writing space on the walls and the mobile furniture...”

*Takes some time*

“I wouldn’t say the change was hard, but it does take some time to get used to”

*Anxious by lost of control*

“...its took away some control...we had to be careful and adjust quickly on that... and to keep an eye”

**Embracing the new learning space**

# Relinquish the control

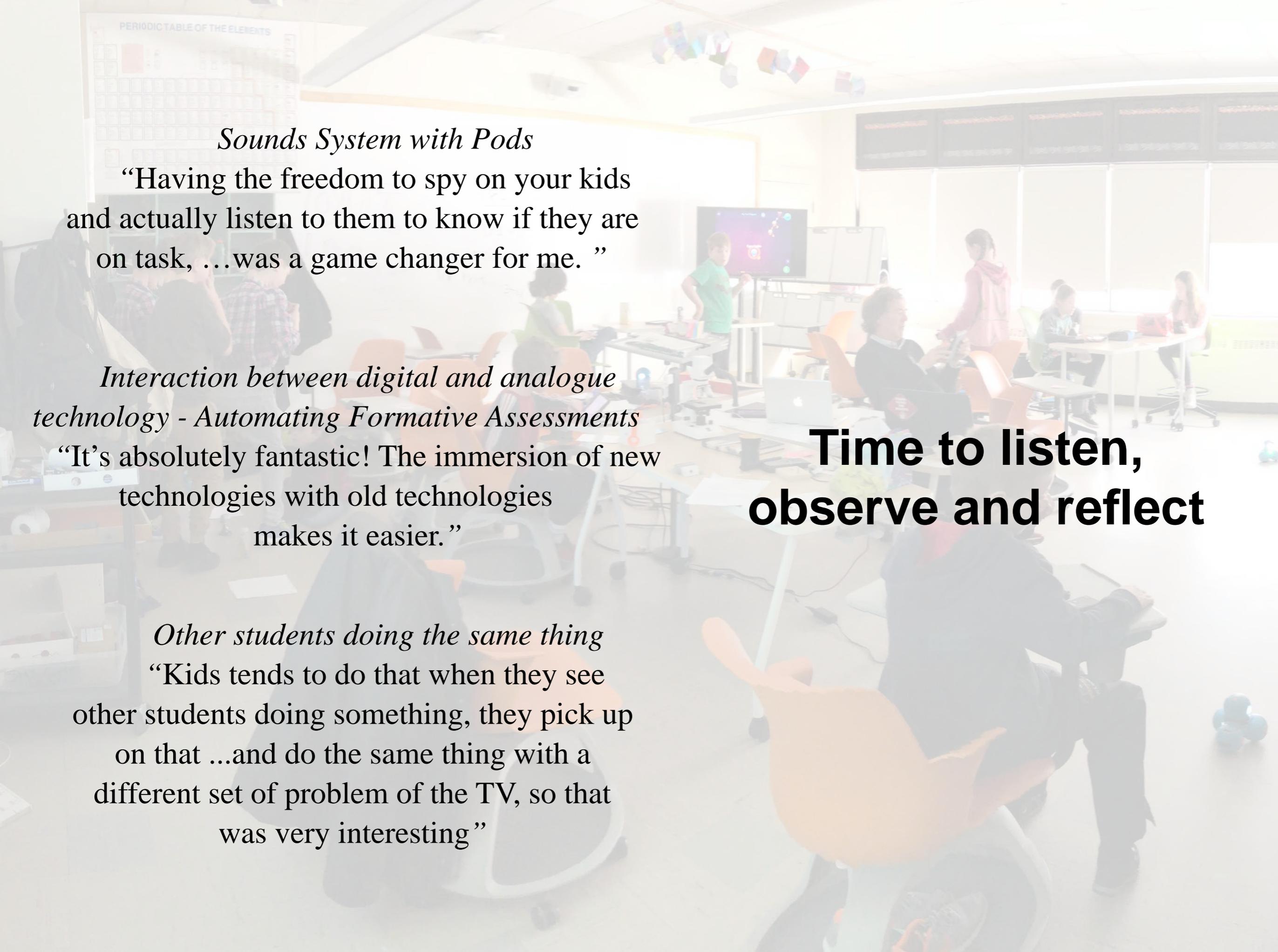
“Offering choices to students to learn by themselves using all the resources available, you know...it is easier to teach the fact it free me up.”

## *Being a facilitator*

“I am a facilitator job now and resource to them... I am going along with them, we are doing this together, it's really neat!”

## *Became a manager*

“ I am managing at the same time learning and it is pretty cool”

A modern classroom setting with students working at tables, a teacher, and a large screen displaying a molecular model. The room is bright and open-plan, with a periodic table of elements visible on the wall.

*Sounds System with Pods*

“Having the freedom to spy on your kids and actually listen to them to know if they are on task, ...was a game changer for me. ”

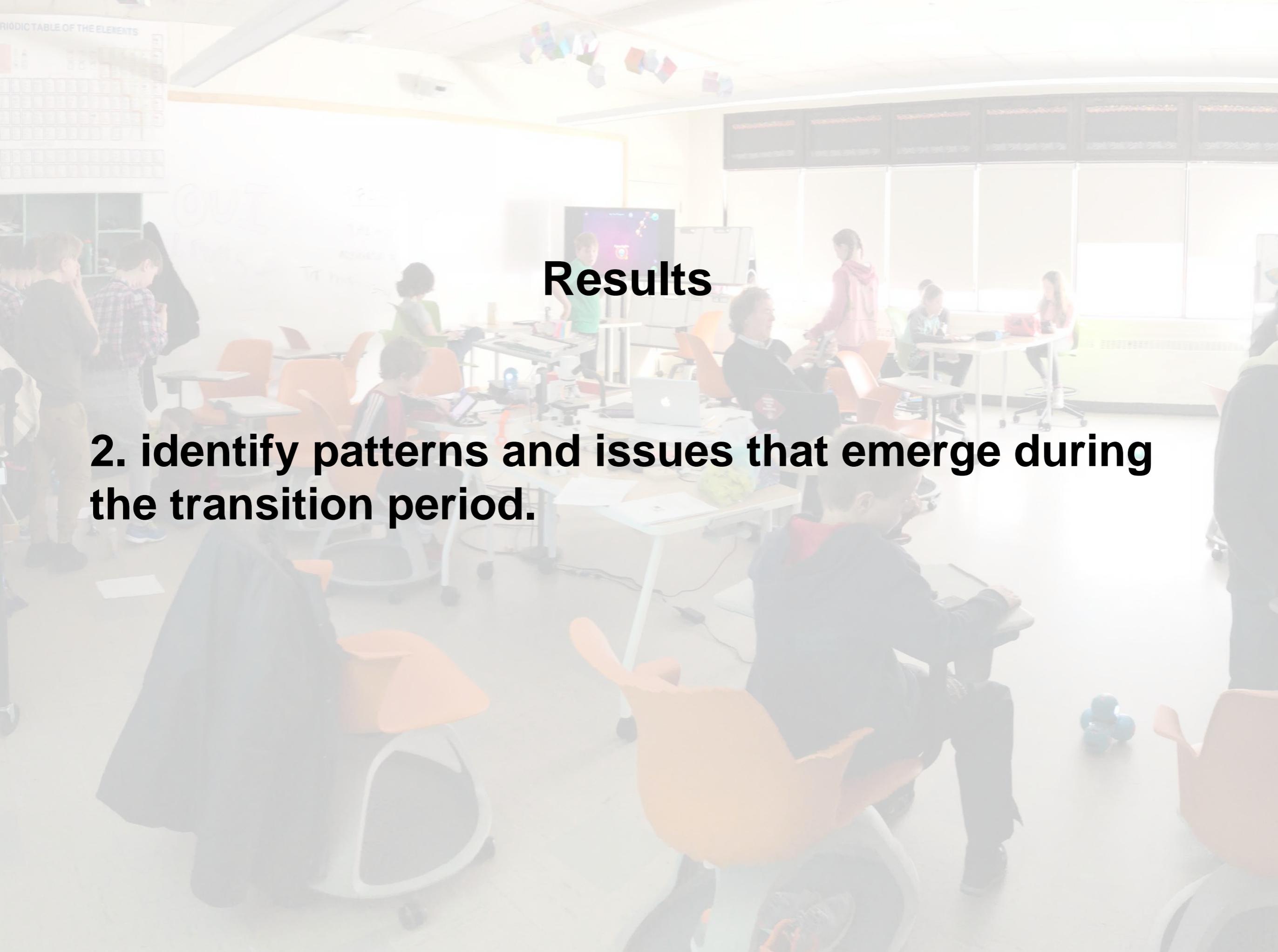
*Interaction between digital and analogue technology - Automating Formative Assessments*

“It’s absolutely fantastic! The immersion of new technologies with old technologies makes it easier.”

*Other students doing the same thing*

“Kids tends to do that when they see other students doing something, they pick up on that ...and do the same thing with a different set of problem of the TV, so that was very interesting”

**Time to listen,  
observe and reflect**



## Results

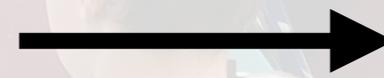
**2. identify patterns and issues that emerge during the transition period.**

# Teaching-Student Transition Phase

Less



Reflexion



More

Teacher

**Control & Deliver  
Content**



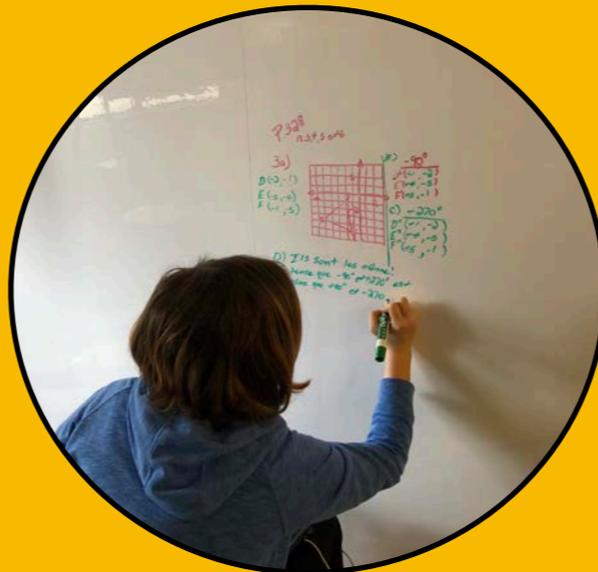
**Passive Learner**

Student



Teacher

**Assist & Guide  
Learning**



**Active Learner**

Student



Teacher

**Manage & Coordinate  
Assets**



**Deep Learner**

Student

Less



Engagement



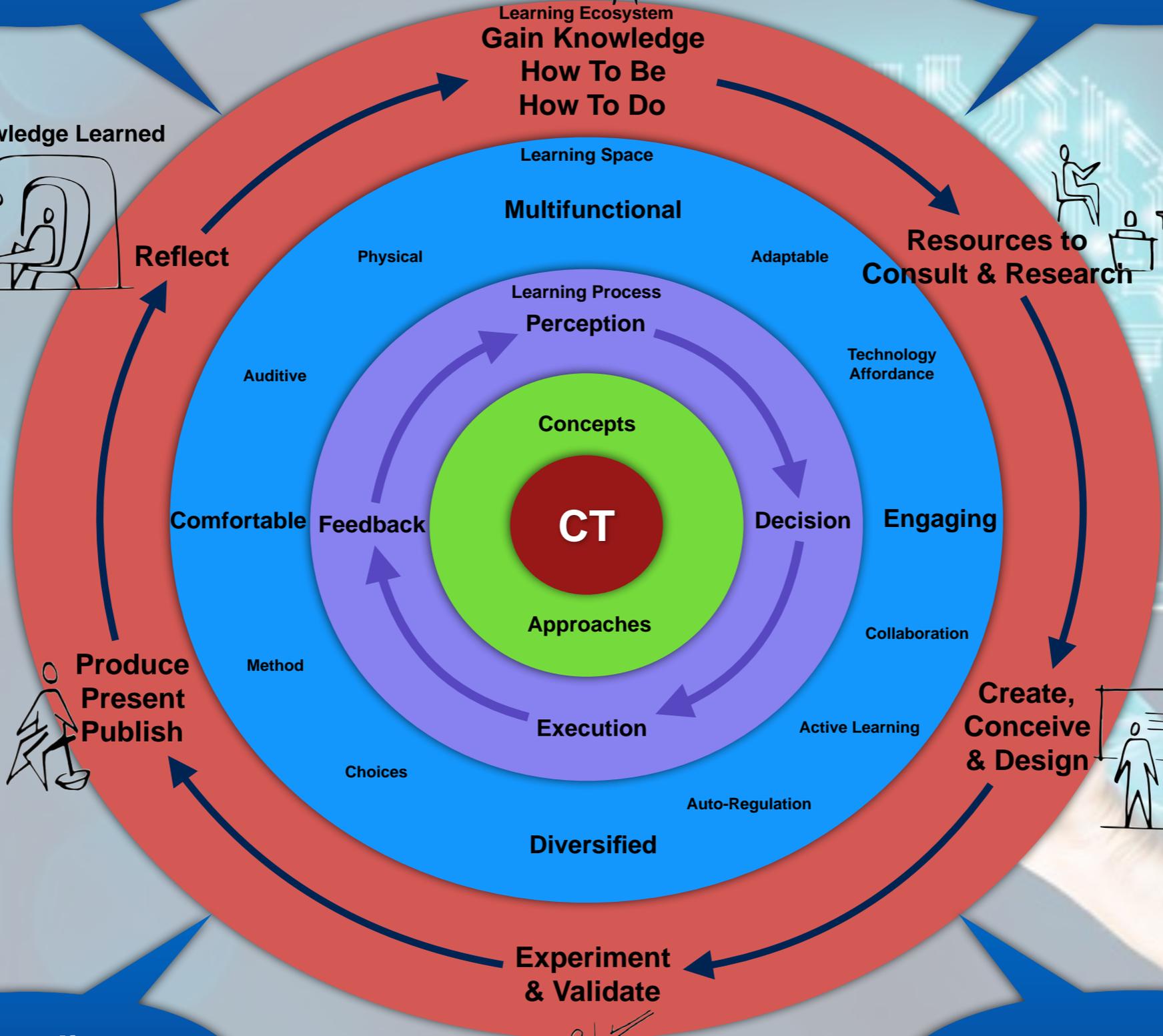
More

Chiasson, M. (2019)

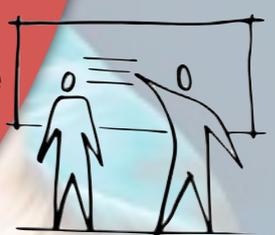
**Decentralize Teaching**

**Inclusive Learning Experience**

Knowledge Learned



**Produce Present Publish**



**Create, Conceive & Design**

**Experiment & Validate**



**Centralize Learning**

**Connect Learning Community**

# Conclusion-Discussion

First objective:

- **Affordances of technology-rich environment:** teachers reflect on their pedagogical practices and explore new approaches of teaching
- **Decentralization of teaching to centralize learning:** teachers adapt to the new space to increase student's engagement.
- **Transforming students' and teachers' roles:** students became actors of their learning and the teachers became a resource to them.

# Conclusion-Discussion

Second objective

- **Evolution of teaching practice:** From being in charge of delivering content to assisting and guiding and further to managing and coordinating the assets of new learning space.
- **Issues of transition:** Becoming a learner

# ***Investigating teachers' transition towards innovative practices in a modern learning space***

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