 Characteristics of learning spaces favouring the development of computational thinking skills

(Pilot Study)

Mario Chiasson
Ph D. student, Université de Moncton

mariochiassson.com
@marioch
“The educator’s job is not to prepare kids to do well in class, but to do well in life.”

–ELLIOIT EISNER
Society went from connected to **hyper-connected** redefining the global economy

–Friedman (2005)
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

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

ADDITION MANUFACTURING OF COMPLEX PARTS
3-D printers create complex parts in one step, making assembly redundant

SMART SUPPLY NETWORK
Monitoring of an entire supply network allows for better supply decisions

AUGMENTED WORK, MAINTENANCE, AND SERVICE
Fourth dimension facilitates operating guidance, remote assistance, and documentation

INDUSTRY 4.0
INTERNET OF THINGS

– Lorenz & al. (2015)
Because of **ICT**, the industry has transformed their **process and culture** of **productivity** in order to perform globally (Lorenz & al, 2015)
New **spaces** nurturing communication, collaboration, and problem solving (Levy & Murnane, 2004)
Industry Evolution

1.0 Steam Industry

2.0 Electrical Industry

3.0 Automated Industry

4.0 Digital Industry

– Lorenz & al. (2015); Toner (2011); Cobo (2013)
The mismatch between formal education and the challenges of innovative society

– Toner (2011); Cobo (2013); Shailaja & Sridaran (2015)
• What **process** was redefined due to ICT?

• Amongst 21st Century skills what are the essential **skills** that the industry is now requiring?

• How did the education system transform their **learning culture**?

• Which **processes** of the education system were transformed to improve students’ performances (**3r+skills**)?
In what ways the characteristics of the learning space influence the process of the development of computational thinking skills of students?
How can the characteristics of the learning space influence the process of the development of computational thinking skills of students?
Goals

1 - Observe student’s Computational Thinking Processes (CTP) in using coding software - (Pilot Study)

2- Identify the characteristics of learning spaces favoring the development of computational thinking (CT) skills.
What is Computational Thinking Skill?
The Computational Thinker: Concepts & Approaches

Concepts
- Logic predicting & analysing
- Algorithms making steps & rules
- Decomposition breaking down into parts
- Patterns spotting & using similarities
- Abstraction removing unnecessary detail
- Evaluation making judgement

Approaches
- Tinkering experimenting & playing
- Creating designing & making
- Debugging finding & fixing errors
- Persevering keeping going
- Collaborating working together

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As part of the 21st century skills, CT is the increasingly essential.

Brennan & Resnick, (2012); Denning, (2009); Bundy, (2007); Djambong & Freiman, (2016); Korucu, Gencturk & Gundogdu (2017); Magana, Marepalli & Clark, (2011)
Research Context

(Pilot Study)

Observe student’s Computational Thinking Processes (CTP) in using coding software
School Board in South East New Brunswick, Canada

Methodology

- 60 grade 6 students from 2 middle schools
- Swift Playground and Scratch
- Middle School Technology Education (MSTE)
- Pre & Post Questionnaire - 22 items
- 5 Months
  - Monthly Interviews & Observations
Findings

Based on the analysis of the corpus
• Love Coding Challenges

• Perseverance & Determination

“I am so excited when I have to solve problem using Swift Playground (...) I just can’t stop!”
• MSTE space was flexible, adaptable and engaging.

• Collaborate with each other using different resources and free navigation through different areas of the learning space

“I love (Teacher’s name) class because we are free to move anything”
Toward the model of the process of CT

Chiasson (2017)©
Next Step

**Identify** the characteristics of learning spaces favoring the development of computational thinking (CT) skills.
What is Learning Space?
Learning Space

Based on the literature survey
Toward the model of the process of CT

Chiasson (2017)
How can the characteristics of the learning space influence the process of the development of computational thinking skills of students?
Thank You!

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@marioch
Reference


