GAGNE`S NINE EVENTS

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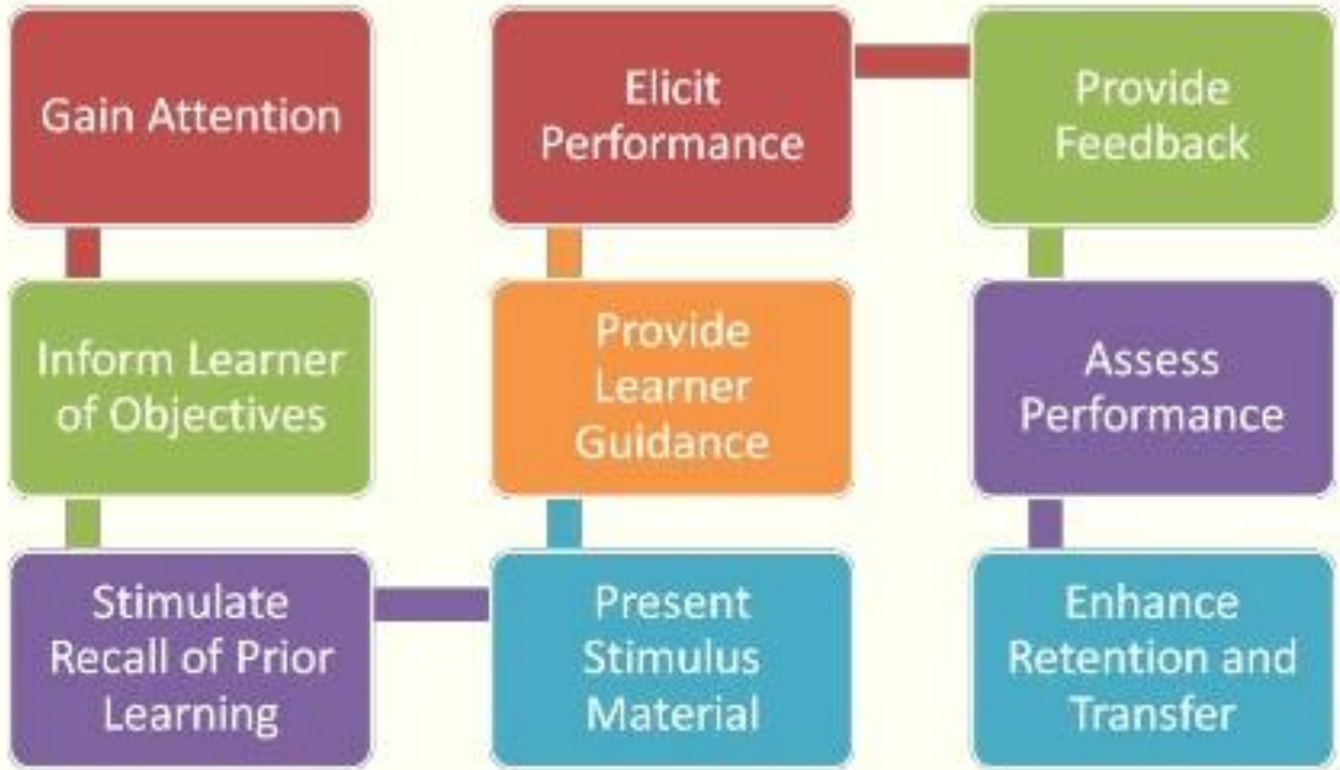
Athens, 2nd of October, 2019

Previously (Warsaw meeting)

We were talking about:

- The motivation
- The learning taxonomy
- The role of interest in the learning process
- Zone of proximal development

GAGNE'S NINE EVENTS OF INSTRUCTION



1. Gain attention of the students

- when starting to use educational robotics in the learning process, it is first necessary to attract the attention of students, which can be done with something new
- often robotics seems interesting and exciting to students, so no other information is likely to be needed
- unless they are already have lost their motivation to learn, and for whom the knowledge that they will need to learn robotics can cast even greater doubt on their desire to learn and succeed.
- In such cases, the teacher's role is to provide information so that students avoid these concerns, which involves the use of words and terms that are clear to all students participating in that class.

2. Inform students of objectives

- It is necessary to inform the students about the learning objectives and the activities that will be done to achieve them.
- it can be predicted that students will have an interest in educational robotics, but we have to keep in mind that when students have a lack of knowledge of some concepts (programming, physics, mechanics) that are important to acquire the knowledge, to build robots, these achievable learning goals may seem difficult or even unattainable for them, and they can avoid specific activities
- the task of the teacher is to make sure that all students understand the goals to be achieved and encourage students to get the support they need and set learning objectives.

3. Stimulate recall of prior learning

- at this stage, the teacher stimulates the discussion of prior knowledge and invites students to remember what they have learned in the past and which may be useful in learning new knowledge about robotics.
- it must be remembered that there are motivated and knowledgeable students who will have this prior knowledge and will be happy to engage in discussions that can make the teacher confident that everyone has the knowledge.
- it should be kept in mind that there may be students in the classroom with lack in previous knowledge, and discussion of other students' knowledge and concepts that are not clear to them, may raise even more doubts about their abilities and contribute to the development of avoidance motivation.
- The teacher's task is to carefully watch what is happening in class and understand which of the students involved in the discussion and have the necessary prior knowledge
- but even more important are those students who are not involved in the discussion, so that the teacher can track whether or not this involvement is based on the introverted nature of the student when he or she has the necessary knowledge but is not ready for public discussion, whether it is a student who does not want to demonstrate his lack of knowledge.

4. Present the content

- the teacher tells and demonstrates the content of the learning.
- Educational Robotics lets you pick constructive robots, where the teacher can show you a ready made robot and tell students how to build and program it by themselves.
- the teacher has to look closely at the students in the classroom to see who is ready to act and support each other, collaborate in groups, and those who would like to work but do not want to do it in groups and those who would like to avoid learning new knowledge because they have no confidence in themselves and are afraid to do something new so that they do not look incompetent in the eyes of others.

5. Provide learning guidance

- getting familiar with the training contents, students can start and the teachers should be available for different types of support.
- . This is the stage where the teacher's job is to see if the students in the groups are equally involved? Isn't it the case that one student dominates the others and does everything by not allowing the other students to become actively involved.
- it is up to the teacher to understand whether it is just a temporary change of role, or if one of the students does not understand and learn from the most active student, and then it is a supportive learning process. But there may also be situations where he is an introverted learner with the knowledge to continue working and developing new ideas, to design and program something new, but he is not ready to work in groups.
- Teacher support, diversification of instruction, slower pace of learning, and teacher recognition can help here to build confidence in the student.

6. Elicit performance (practice)

- the teacher's task is to allow students to work in practice, so that they gradually consolidate their prior knowledge as well as develop their sensory skills in connecting various details.
- At this step, the teacher's role is to observe students practicing and those students who have mastered the entire offer sophisticated tasks to challenge the new solutions in order to avoid that they are slowly starting to get bored
- For students who are slow-workers or who have developed avoidance motivation and who have finally become enthusiastic about robotics, it must be allowed to practice to consolidate newly acquired knowledge (skills to match robot parts and develop a program) for such practical activities, with already learned and known things

7. Provide feedback

- The role of the teacher at this stage is to continuously provide feedback on what has been done, and this is not new to the work of teachers, but here are some things to keep in mind:

- students who are actively engaged, looking for new solutions, show willingness to learn and act, receive feedback from the process itself, because in educational robotics activities, developed artifacts that work, move, can play a variety of sounds, demonstrate that knowledge is practical value. In this way, robotics artifacts are like learning agents;
- students who have low confidence in their own abilities, who have avoidance motivation, are the ones who need continuous feedback.

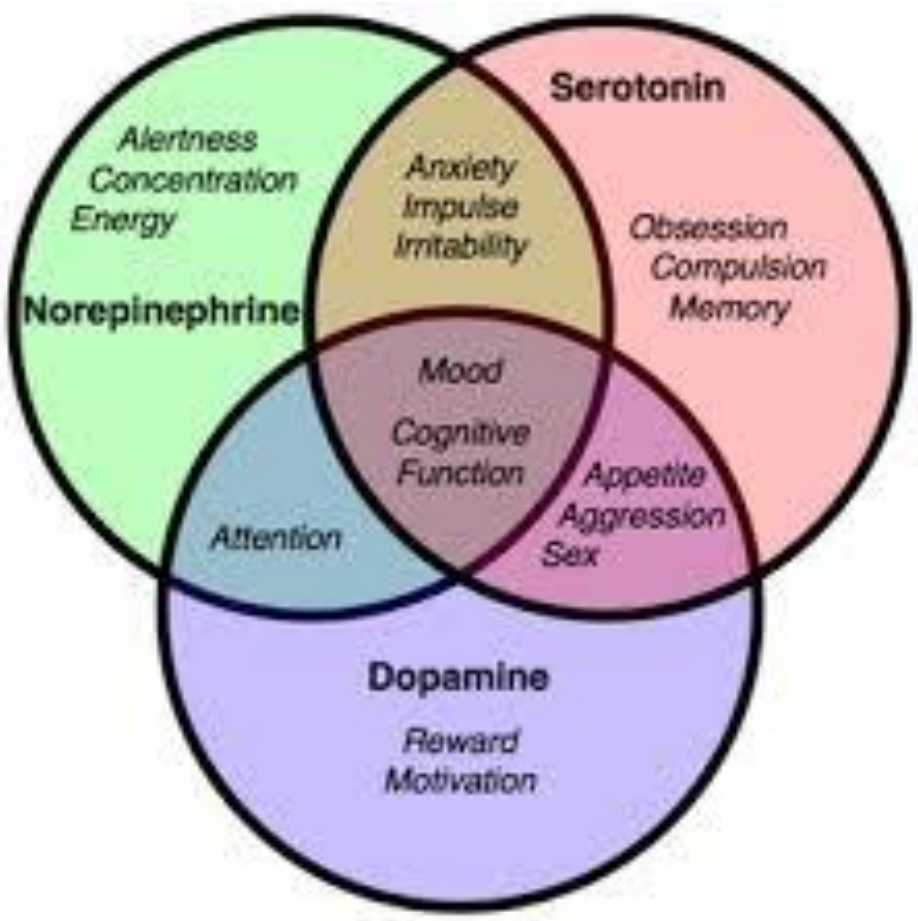
8. Assess performance

- Sometimes a simple feedback is sufficient, but sometimes a formal evaluation of the work is required
- It is important to remember that assessment is one of the motivating factors in the assessment process, so it would be important to look not only at the quantitative increase in knowledge, but also at the students progress towards themselves.
- If educational robotics is introduced in a learning process where formal assessment is not necessarily required, the teacher should keep in mind that job evaluation is one of the motivators, so it is necessary to provide students with an assessment of their performance from time to time. but in this case it would be advisable to avoid summative formal assessment by focusing more on the progress achieved and providing that each student is seen and positively evaluated.

9. Enhance retention and transfer to the job

- Educational robotics that take place through Constructionism paradigm when students are continuously learning hands-on practice, ensure that this step, designed by Gagne and colleagues, is already included in the previous steps and that no specific activities may be required here
- However, at this stage, the teacher may suggest to the students to develop a specific solution that is needed by the community or the individual. For example, fire alarm system, watering system, traffic light system for the city, etc.

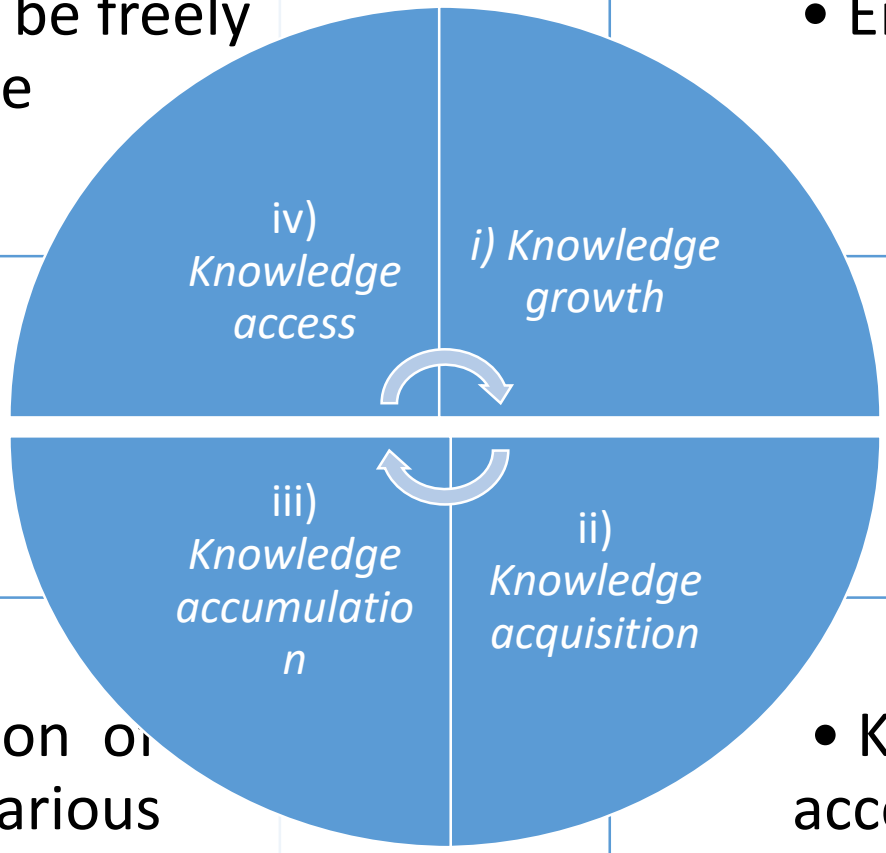
Dopamin and motivation



The knowledge dimensions

- Knowledge can be freely accessed for use

- Enhanced learning outcomes

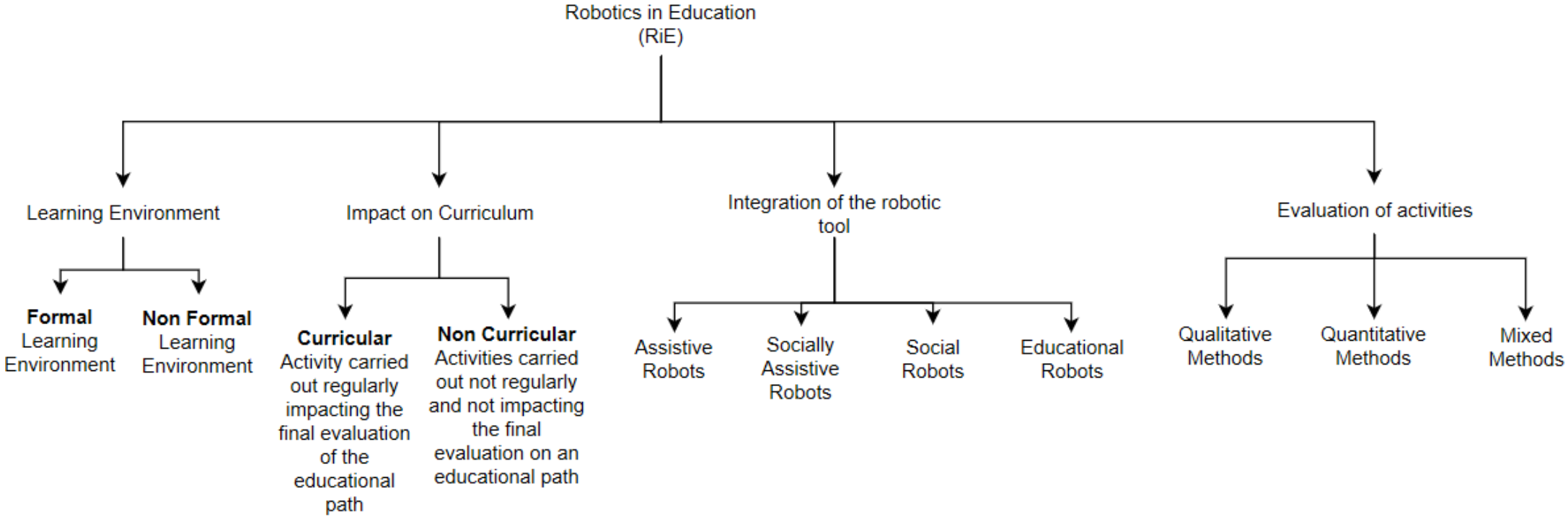


- The accumulation of knowledge in various media

- Knowledge can be accessed in different ways

The proposed classification for Robotics in Education (RiE)

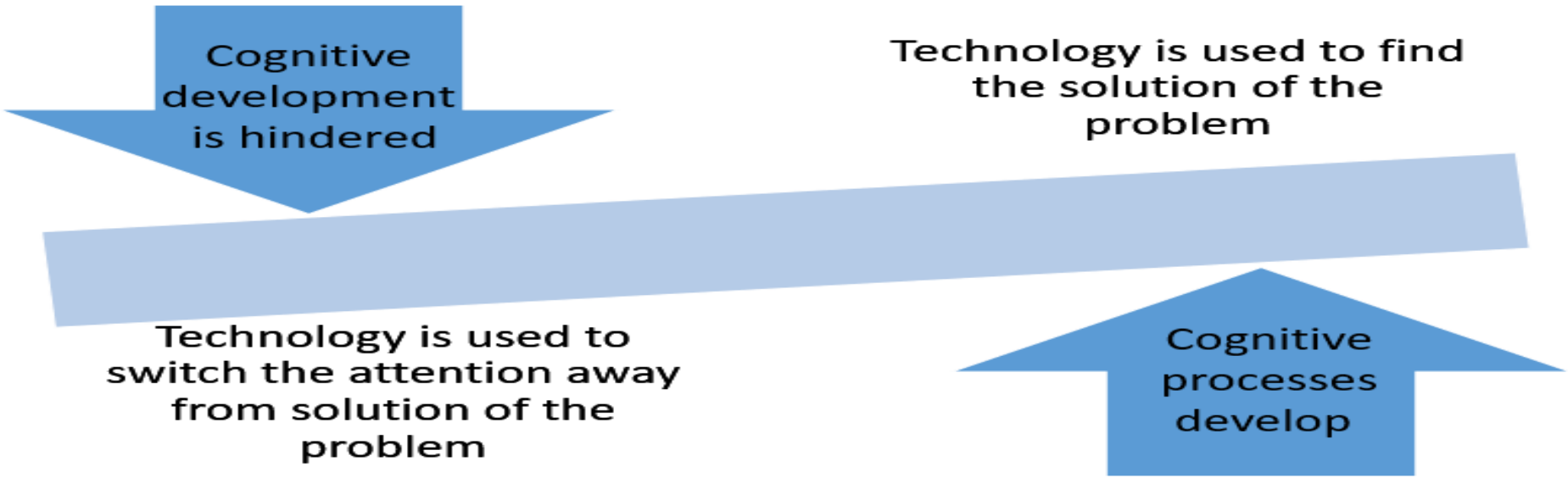
David Scaradozzi, Laura Screpanti, Lorenzo Cesaretti, 2019

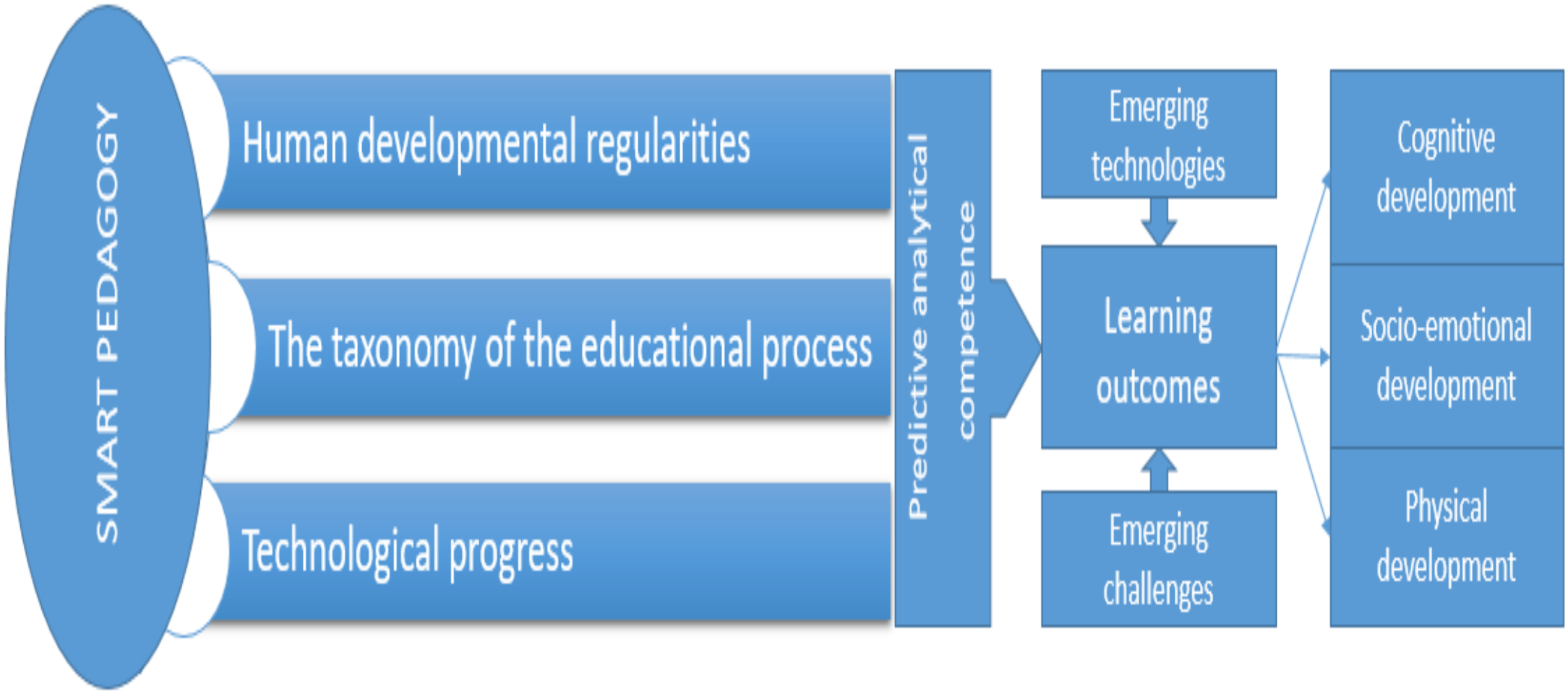


What else should be considered

- Do students have all the necessary knowlede?
- How the learning process is organized?
- How long will be lessons?
- How many students in the group?
- How many teachers in the classroom?
- What is the capacity of cognitive load?
- Extravets versus intraverts?
- Grouping principles?
- How much writing?
- Maybe it is worth thinking about robots as learning agents
- Motivation of students

Challenges of technology use for cognitive development




SMART PEDAGOGY
Human developmental regularities
The taxonomy of the educational process
Technological progress
Predictive analytical competence
Emerging technologies
Learning outcomes
Emerging challenges
Cognitive development
Socio-emotional development
Physical development

ROBOSCIENTISTS PROJECT

Motivating secondary school students towards STEM careers through robotic artefact making

Erasmus+ KA2 2018-1PL01-KA201-051129

Creators

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Declaration

This report has been prepared in the context of the ROBOSCIENTISTS project. Where other published and unpublished source materials have been used, these have been acknowledged.

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