

# Global synthesis of 1st wave discussions

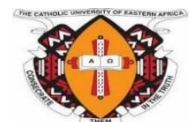
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## Global-Education analysis

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In 2023, discussions on what it means to be human in the time of neuroscience (NS) and AI have been facilitated by NHNAI partners in 9 different countries. In each country, 3 lines of discussions have been opened to explore this question in the **3 thematic fields of education, health, and democracy**. Each partner then produced 3 **local syntheses** reporting on the content of discussions in these 3 fields in the corresponding countries.<sup>1</sup> On this ground, the coordination team proposed 3 **global thematic syntheses** (one per field explored, education, health and democracy). Finally, ideas of these 3 global thematic syntheses have been grouped to generate one **global-transversal synthesis**, gathering ideas that were more general and have been expressed in different thematic field.

This document presents **ideas of the global-education synthesis**, together with nexuses in which some ideas emerging from discussions enter in conflict and tension, manifesting possible complexities and delicate points of questions related to the topic of education.



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<sup>1</sup> For an exact total of 8\*3 + 2 local syntheses. In Canada (Québec), Cégep Sainte-Foy organized discussions focused on Democracy and Education, but not on Health.

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# Part 1: Global-Education ideas

Being human in the time of NS and AI means ...

## Still having relationships and physical interactions with other humans

Being human means having physical interactions and this is of most importance in education. Physical interactions seem to be a fundamental space to learn how to communicate and behave with others, how to live with others in society, and to learn emotions and self-control. That is why school is not just a place to learn facts and theories but remains a fundamental place where social skills are learned and moral values transmitted. These interactions enable also discussions and confrontations of different point of views, which open the space of the debate. On top of that, there is an affective dimension within the relation between teacher and learner that could play a major role in the motivation and the attention of the learner, which can be expressed by the teacher's physical presence and passion. Non-verbal communication and corporal language are also important in these physical interactions. School is the place of learning how to make society altogether, how to behave on the basis of an ethical reasoning, which is built through physical and social relations. AI systems and technology may unsatisfy and perturbate those aspects of this fundamental need as digital devices and AI tools are more and more used for pedagogical aims and learners are more and more learning in front of their screens. AI tools cannot replace human presence and his fundamental components, technology may thus foster individualism and people may be less motivated to invest in human relationships.

**Involvement in nexuses of complexity** (see below [Part 2: Global-Education nexuses of complexities](#)):

- [Making quality education accessible while preserving the human development](#)
  - [I- Making quality education accessible while preserving relationships](#)

*Corresponding ideas from local thematic syntheses:*

6 countries (BE, CA, FR, TW, PT, USA), 11 claims / ideas

- (Belgium – Education): AI technology as a threat to the students' education
- (Belgium – Education): The psychological risks associated with a highly digitalized education
- (Canada – Education): Preserving the human contact of the teacher-student relationship in education
- (Canada – Education): Online connections between students are no substitute for human interaction
- (France – Education): Maintaining human contacts and preserving the teacher-learner relation
- (Portugal – Education): Human relationships are fundamental to development
- (Portugal – Education): Technology is harmful to social relationships
- (Portugal – Education): Experiencing emotion is exclusive to humans
- (Portugal – Education): Education also occurs outside the classrooms
- (Taiwan – Education): There is something unique about human beings that cannot be algorithmized
- (USA – Education): Competition between human teachers and AI in the field of education

## Preserving the fundamental needs required for the human (cognitive) development

AI technologies can harm the human development especially in children, in all his fundamental spheres: physical, psychological, cognitive and social. Notably by replacing human in several tasks, one can wonder about the risk of cognitive impoverishment AI can lead to. Moreover, cognitive abilities such as

creativity, problem-solving must be developed through practice. Students' use of AI technologies like ChatGPT can hinder the development of these skills. In addition, an intensive use of technologies can also create addiction, trouble sleeping, cyberbullying and isolation that can be harmful for the human development. The human development also passes through a better understanding of the human being, a consideration of the mind and the body, and this should be considered at school and in education.

**Involvement in nexuses of complexity** (see below [Part 2: Global-Education nexuses of complexities](#)):

- [Making quality education accessible while preserving the human development](#)
  - [II- Making quality education accessible while preserving the cognitive development](#)

Corresponding ideas from local thematic syntheses:

7 countries (BE, CA, FR, TW, PT, CH, KE), 10 claims / ideas

- (Belgium – Education): The psychological risks associated with a highly digitalized education
- (Canada – Education): Developing human cognitive skills through practice
- (Chile – Education): Comprehensive training and curricular contents
- (France – Education): Preserving human autonomy
- (France – Education): Fighting against cognitive impoverishment
- (France – Education): Accepting difficulty and fostering self-improvement
- (Kenya – Education): Technology promotes laziness
- (Taiwan – Education): Overdependence on AI will reduce human thinking ability
- (Portugal – Education): Humanity derives from having a mind and a body
- (Portugal – Education): Technology is harmful to development

## Using AI and NS to better teach and learn

AI technology can facilitate learning notably thanks to a better accessibility of didactic material (online platforms, videos ...), by making some tasks easier and faster to complete and by assessing learning outcomes. AI can be used to compensate human limits and will maybe lead to develop new kind of cognitive skills that will be necessary in a close future notably at work and it can be a useful tool to foster innovation. However, using AI to be more productive requires to be correctly informed about the functioning of AI technology to properly use it, in a way that serve humans.

**Involvement in nexuses of complexity** (see below [Part 2: Global-Education nexuses of complexities](#)):

- [Making quality education accessible while preserving the human development](#)

Corresponding ideas from local thematic syntheses:

6 countries (BE, CA, PT, TW, FR, KE), 8 claims / ideas

- (Belgium – Education): Pros and cons of employing technology at school
- (Canada – Education): Making humans more efficient
- (France – Education): Undesirable: fighting against informational bubbles
- (France – Education): Compensating human biases
- (Kenya – Education): Monitoring and evaluation
- (Kenya – Education): Opportunity to learn other languages
- (Portugal – Education): Humans have limited cognitive and performance abilities
- (Taiwan – Education): AI can enhance human capacities

## Preserving (cultural) diversity and human singularity

Human is a complex living-being who cannot be reduced to data or brain. AI and NS may have the tendency to give the impression that human can be caught by creating a complete profile with data

and predict his future behaviors or thoughts or by neuroscientific explanations only. But we should rather prefer a holistic approach that include biological, psychological and social spheres and aspects of the human life that cannot be reduced to data. Humans are all different, with also different spiritualities and this difference is a richness for humanity that we should preserve from the threat of unification AI and NS can bring.

Corresponding ideas from local thematic syntheses:

4 countries (FR, PT, KE, TW), 7 claims / ideas

- (France – Education): Preserving diversity and accounting for human beings' singularity
- (France – Education): Fostering self and other-understanding thanks to NS and AI
- (France – Education): Taking care of not reducing persons to categories
- (Kenya – Education): AI must be context-driven
- (Kenya – Education): Conflicting spiritualities
- (Portugal – Education): Undesirable: overvaluing children's cognitive abilities may be harmful
- (Taiwan – Education): There is something unique about human that cannot be algorithmized

## Preserving human autonomy

Autonomy seems to be a fundamental value to preserve in the time of AI especially in education, because one of the principal roles of this latter is to help human to grow up and become a human capable of thinking by himself and make informed decisions. AI may impact this autonomy by creating dependency, also by rendering his comprehension of his functioning less accessible to everyone and by creating a surveilled world. Moreover, humans should stay entirely responsible for AI decisions.

**Involvement in nexuses of complexity** (see below [Part 2: Global-Education nexuses of complexities](#)):

- [Making quality education accessible while preserving the human development](#)
  - [II- Making quality education accessible while preserving the cognitive development](#)

Corresponding ideas from local thematic syntheses:

7 countries (FR, CA, IT, CH, TW, USA, BE), 8 claims / ideas

- (France – Education): Preserving human autonomy
- (Canada – Education): Preserving autonomy
- (Italy – Education): Protecting learners' privacy and autonomy
- (Chile – Education): Socioemotional skills and development of identity and autonomy
- (Belgium – Education): Undesirable: Uncontrolled use of AI technologies
- (Chile – Education): Education and human development
- (Taiwan – Education): Humans should be ultimately responsible for the decisions made by AI
- (USA – Education): New AI-powered objects and sensors: the internet of things

## Developing critical thinking

Critical thinking seems to be a fundamental value and human ability to have in the time of AI and NS. It seems crucial to encourage the development of this ability at school since we live in world full of information and AI might bring more disinformation, compromising the relationship between human and knowledge (or truth).

Corresponding ideas from local thematic syntheses:

3 countries (FR, PT, IT), 5 claims / ideas

- (France – Education): Developing critical thinking
- (Italy – Education): Fostering critical thinking

- (Portugal – Education): Desirable: as disinformation increases, the promotion of critical thinking in school is key
- (Portugal – Education): Intelligence is exclusive to humans
- (Portugal – Education): Undesirable: knowledge is becoming unimportant

## Having time for human flourishing

The time for leisure or the time that is not work appears as a precious time to exert humanity and for the human flourishing. AI may bring such time as it is more and more used to replace humans in several tasks. It might help to reach the human flourishing by releasing human from work.

### Corresponding ideas from local thematic syntheses:

2 countries (PT, USA), 5 claims / ideas

- (Portugal – Education): Dedicating time to fulfilling activities is essential for individuals to exert their humanity
- (Portugal – Education): Undesirable: the dominance of work in daily life turns humans into robots
- (Portugal – Education): Desirable: education also occurs outside the classrooms
- (USA – Education): Education is instrumentally for work and intrinsically for leisure
- (USA – Education): Religion, human purpose and AI

## Seeking the human purpose of education

In the time of AI & NS, it is important to reflect on the purpose of education. For instance, it seems to be easy nowadays to cheat with AI and to learn with gamification. This raises the question of student assessment: what do we want to assess? What is important to evaluate? What do we educate for? And the purpose of learning: why do we learn? Although productivity and performance are real economic needs, it seems that education should also make the human search for life meaning a priority. Moreover, success and performance may threaten the human development and lead students to consume medication to improve their academic performance, which may be harmful as well as overfocusing on the children's cognitive abilities.

### Corresponding ideas from local thematic syntheses:

3 countries (USA, PT, CH), 9 claims / ideas

- (Chile – Education): Education and success-oriented society
- (Portugal – Education): Humans' search for life meaning should be a priority
- (Portugal – Education): The use of medication to improve academic performance among healthy students is harmful
- (Portugal – Education): Overvaluing children's cognitive abilities may be harmful
- (USA – Education): The human purpose of education and how AI aligns
- (USA – Education): Desirable: Education is desirable regardless of economic usefulness
- (USA – Education): Cheating in education by using AI (4 extracts)
- (USA – Education): Undesirable: Using AI to "gamify" education
- (USA – Education): Religion, human purpose, and AI

## Preserving creativity

Even if generative AI can be used for creativity, it seems that creativity is something that belongs to human and sometimes appears through the relation between humans, sometimes through practice. An excessive and exclusive use of AI technologies in education may constrain this ability.

### Corresponding ideas from local thematic syntheses:

5 countries (BE, PT, CA, KE, IT), 6 claims / ideas

- (Belgium – Education): AI technology and the job of a teacher
- (Belgium – Education): Integrating AI technologies with traditional pedagogy
- (Canada – Education): Developing human cognitive skills through practice
- (Italy – Education): Fostering critical thinking and creativity
- (Kenya – Education): Technology promotes laziness
- (Portugal – Education): Creativity is exclusive to humans

Things ethically undesirable ...

## Replacing human and human's interactions by AI technologies

AI technologies should never replace humans but rather support students and teachers in their job. The teacher-learner relation and face-to-face interactions should be preserved and maintained even in the era of online courses and virtual interactions.

Corresponding ideas from local thematic syntheses:

6 countries (FR, BE, CA, USA, KE, PT), 7 claims / ideas

- (Belgium – Education): Pros and cons of employing technology at school
- (Canada – Education): Face-to-face interaction with teachers and between students must not be substituted by online courses supported by AI technologies
- (France – Education): Human replacement
- (Kenya – Education): Undesirable: Human replacement by machines
- (Kenya – Education): Undesirable: Humans as robots
- (Portugal – Education): Humans should maintain a prominent role in educational contexts
- (USA – Education): Teaching, Learning and Teacher-Learner Relationship

## An excessive use of AI that lead to cognitive impoverishment

An excessive use of AI and technologies may seriously impact the cognitive development of the youth, notably by catching their attention, developing addictions and creating dependence, rendering them not able to think or doing things by themselves. Moreover, AI can facilitate learning by personalizing it, thus giving no chances to student to make efforts and be confronted to the difficulty, which may be an opportunity to develop skills and values.

**Involvement in nexuses of complexity** (see below [Part 2: Global-Education nexuses of complexities](#)):

- [Making quality education accessible while preserving the human development](#)
  - [II- Making quality education accessible while preserving the cognitive development](#)

Corresponding ideas from local thematic syntheses:

4 countries (FR, CA, BE, TW), 6 claims / ideas

- (Belgium – Education): Uncontrolled use of AI technologies
- (Canada – Education): The use of AI technologies must not hind the development of cognitive skills considered important for human beings
- (France – Education): automation of uninteresting tasks
- (France – Education): Modifying algorithms to fight against informational bubbles
- (France – Education): making learning easy
- (Taiwan – Education): Overdependence on AI systems



## Exacerbating social and economic inequalities with AI

The rapid development of AI is likely to increase the already existed social and economic inequalities, thus rendering this technology accessible to rich and favored people only. This could also lead to social control by a few. Moreover, economy is not the only criteria that should be considered when decisions have to be made about AI.

### Corresponding ideas from local thematic syntheses:

7 countries (BE, IT, PT, TW, KE, CH, USA), 10 claims / ideas

- (Belgium – Education): The problem of countering economic speculation
- (Chile – Education): Social challenges for educational progress
- (Italy – Education): Equitable access to AI in education
- (Kenya – Education): Desirable: more resources and financial costs for vulnerable people
- (Kenya – Education): Desirable: taking account of AI bias for more inclusivity
- (Kenya – Education): Undesirable: exclusion of African indigenous knowledge
- (Portugal – Education): Undesirable: Technology may increase inequalities
- (Taiwan – Education): AI will deepen the social inequalities
- (Taiwan – Education): Undesirable: Power imbalance leading to social control
- (USA – Education): Concern about harms caused by AI

Things ethically desirable ...

## Fostering social inclusion thanks to AI technologies

AI technologies can be used to foster social inclusion through different uses, notably by personalized learning. In fact, personalizing exercises depending on the level, rhythm of the learner may be helpful to prevent dropping out of school or to avoid a too large gap between students. It is also a manner to consider the diversity and differences between learners. There is also the possibility of digital debates that can be an opportunity for shy people to express themselves with others and different app of translations to help strangers with language difficulties or vulnerable/disabled people. It enables also to be rapidly informed of what happens in the world. Neurosciences also participate to this social inclusion by speaking about neurodiversity and communicate a lot about the learner's difficulties (such as dyslexia, ADHD...).

### **Involvement in nexuses of complexity** (see below [Part 2: Global-Education nexuses of complexities](#)):

- [Making quality education accessible while preserving the human development](#)
  - [I- Making quality education accessible while preserving relationships](#)

### Corresponding ideas from local thematic syntheses:

6 countries (CH, CA, FR, BE, TW, KE), 10 claims / ideas

- (Belgium – Education): AI technology and social inclusion
- (Canada – Education): The use of AI technologies can complement the teaching provided by a human teacher to enable personalized learning
- (Canada – Education): The use of digital and AI technologies can be an additional way of getting students to debate with each other
- (Chile – Education): AI as an educational tool
- (Chile – Education): Technology as a reflection of society
- (France – Education): Desirable: personalizing learning thanks to AI
- (France – Education): Desirable: Fostering knowledge acquisition and cultural inclusion
- (Kenya – Education): Deaf and Hard of Hearing Supported by AI App
- (Kenya – Education): Opportunity to learn other languages
- (Taiwan – Education): Desirable: Human-AI cooperation in education



## Fostering AI & NS literacy

It seems important to foster AI & NS literacy at school for teachers and learners to enable them to be more aware of the ethical and societal issues raised by these technologies, and to be more able to properly reflect on it and on their use.

### Corresponding ideas from local thematic syntheses:

2 countries (FR, CH), 4 claims / ideas

- (Chile – Education): Challenges in teacher training
- (Chile – Education): Role of the school in the face of technological changes
- (France – Education): Possessing a minimal level of literacy about science & technology
- (France – Education): Fostering AI & NS literacy

## Updating educational approaches (student assessment, teacher training...)

Education should not only consist to memorize facts but also to support individuals in their search for life project and encourage them to develop abilities they will need as citizen and autonomous human being, capable of reflecting on the global challenges in the world and preparing to the unknown. Moreover, the integration of AI technologies in education lead to review some educational approaches such as student assessment, teacher and learner training.

### Corresponding ideas from local thematic syntheses:

3 countries (PT, CH, USA), 9 claims / ideas

- (Chile – Education): Challenges of the educational system
- (Chile – Education): Challenges in teacher training
- (Chile – Education): Uncertainty and future challenges
- (Chile – Education): Role of the school in the face of technological changes
- (Chile – Education): Spirit of the era and changes in AI
- (Chile – Education): Challenges and optimism facing the future
- (Chile – Education): Continuous adaptation in a post-pandemic education
- (Portugal – Education): Educational priorities should be reviewed
- (USA – Education): Challenge of student assessment due to AI changing education and educational practices

## Encouraging ethics in education

Ethics should be an important component of education, including at school and not solely as a reflection that accompanies new technologies. Even if AI technologies should be included with an ethical awareness of the societal issues it raised (notably regarding the ecological crisis but not only), ethics should be a priority in education, notably for learning how to live together and avoid individualism which may threaten the common good.

### Corresponding ideas from local thematic syntheses:

5 countries (PT, CH, FR, IT, BE), 10 claims / ideas

- (Belgium – Education): AI should serve human civilization
- (Belgium – Education): Desirable: an ecological employment of AI technologies
- (Belgium – Education): Desirable: AI technology as an instrument of social sensibilization
- (Chile – Education): Integration of AI in Teaching
- (Chile – Education): Ethical use of AI and technologies in general
- (Chile – Education): Ethics and professionalism in education

- (France – Education): Sharing a common ground
- (Italy – Education): Ethical literacy and mindset
- (Portugal – Education): Desirable: education should be based on values
- (Portugal – Education): Technology is harmful to social relationships

## Fairer recognition of all professional jobs

There may exist an inequality of recognition of all professional jobs and cursus, and AI may increase this inequality by overvaluing jobs that are related to technological professions whereas the other jobs are key in our society.

### Corresponding ideas from local thematic syntheses:

2 countries (FR, PT), 2 claims / ideas

- (France – Education): Desirable: fairer recognition of all types of courses and jobs
- (Portugal – Education): Undesirable: technological professions may become overvalued

## Using AI to release human from work

Since AI can replace humans in several tasks, we should take this opportunity to liberate time for focusing on the essential, such as relationships or anything that foster human flourishing, and to release human from repetitive and annoying tasks.

**Involvement in nexuses of complexity** (see below [Part 2: Global-Education nexuses of complexities](#)):

- [Making quality education accessible while preserving the human development](#)
  - [II- Making quality education accessible while preserving cognitive development](#)

### Corresponding ideas from local thematic syntheses:

3 countries (PT, KE, FR), 4 claims / ideas

- (France – Education): Liberating time for focusing on the essential
- (France – Education): Desirable: automation of repetitive or uninteresting tasks
- (Kenya – Education): Technology supplements education
- (Portugal – Education): Desirable: machines replacing humans in certain tasks is efficient and liberating

## Need more regulatory measures

The use of AI in education calls for more regulatory measures in order to ensure the protection of humans.

### Corresponding ideas from local thematic syntheses:

4 countries (TW, USA, KE, CH), 5 claims / ideas

- (Chile – Education): Ethics and Professionalism in Education
- (Kenya – Education): AI related challenges in education
- (Kenya – Education): Technology risks
- (USA – Education): AI should never harm people
- (Taiwan – Education): Desirable: Need more efficient regulatory measures

## Using AI to improve performance and innovation

AI technologies can help us to improve our performances by being more efficient. Moreover, AI can offer new possibilities to increase innovation notably in education but also concerning conditions on Earth, such as life expectancy.

**Involvement in nexuses of complexity** (see below [Part 2: Global-Education nexuses of complexities](#)):

- [Making quality education accessible while preserving the human development](#)
  - [II- Making quality education accessible while preserving cognitive development](#)

Corresponding ideas from local thematic syntheses:

4 countries (CH, PT, TW, BE), 5 claims / ideas

- (Belgium – Education): Desirable: AI technologies as a tool to improve life conditions on earth
- (Belgium – Education): The FLOSS approach as an innovative educational tool
- (Chile – Education): Integration of AI in teaching
- (Portugal – Education): Desirable: scientific and/or technological innovations are beneficial to education
- (Taiwan – Education): Human-AI cooperation in education

## **Part 2: Global-Education nexuses of complexities**

Being human in the time of NS and AI implies to carefully explore nexuses of complexities where valid ideas are nonetheless in tension, manifesting subtleties and challenges one should not overcome. Here are below some examples of **education nexuses of complexities** identified based on **local and global syntheses**.

### **Making quality education accessible while preserving the human development**

#### **I- Making quality education accessible while preserving relationships**

The participants highlighted the benefits that AI can bring to education. Starting with digitization, which makes online teaching materials accessible to anyone, facilitating instruction outside class hours, enabling pupils and students to extend subjects seen in class, and making it easier to catch up on lessons when absent, thanks to online school platforms. Online discussion and debate forums also enable people who are too shy or less comfortable speaking to express themselves. AI also presents itself as a virtual assistant that can help with language learning. AI-assisted language learning is becoming more accessible thanks to translation systems, which are now indispensable for people with language difficulties or for the deaf or hard-of-hearing, as mentioned in Kenya and France. And as language learning partly requires oral practice, conversational robots are sometimes more effective than language books. This is exactly what chatbots like ChatGPT can be used for. Used wisely, they can be a formidable pedagogical tool, a necessary aid to learning and complementary to the teacher. In addition, the complementary nature of AI and the teacher was emphasized several times in the discussions, and this is illustrated in particular in the personalization of learning. AI makes it possible to personalize learning paths according to each student's pace, level and ability. As it is physically and cognitively impossible for the teacher to take into account the specificities of each student, AI enables him or her to have an overall view and to identify students in difficulty who are in greater need of support.

But participants also recognize that AI's contribution to education (more inclusion, more access...) very often comes at the expense of physical interaction and human contact, and this concern was almost unanimous in the discussions. The availability of online learning materials can also have the negative effect of encouraging students to invest less time in classroom activities, or even prompting some to drop out and home-school, given that everything is now available online, and within everyone's reach. In Portugal and other countries, there is also a risk evoked that younger people, having become accustomed to this new format of online relationships, will become content with these virtual contacts and underestimate their relational, emotional and physical needs, to the point of becoming distant and cold in contact with others. According to one participant, we can't do without real face-to-face interactions when it comes to learning "how to be, how to know and how to act". But beyond this learning,

it's also in physical interactions that empathy, emotion, mutual and reciprocal understanding - in short, the encounter with the other - come into play. And, as one participant in Canada pointed out, it is sometimes the presence of a teacher and the transmission of his or her passion and emotions that play an important role in the learner's motivation and attention, and therefore in his or her learning. So school is not just a place for learning, but also a place for sharing, meeting new people, and learning to live together, to make society altogether. Through physical interaction, we confront each other, learn social codes and pass on values. Digitalized education, or education that takes place too much behind screens, can ultimately run the risk of reinforcing individualism and egoism, which would be a major brake on living together and a threat to social cohesion.

Ideas from local and global synthesis mobilized in this nexus of complexity:

- [\(Education – Global\) Fostering social inclusion thanks to AI technologies](#)
- [\(Education – Global\) Using AI and NS to better teach and learn](#)
- [\(Education – Global\) Still having relationships and physical interactions with other humans](#)
- [\(Education – Global\) Not replacing human and human's interactions by AI technologies](#)

## **II- Make quality education accessible while preserving the cognitive development**

The participants evoked the advantages of using AI in education. First, AI can help us to be more productive and efficient, because some tasks are easier and faster to complete with AI (such as synthesis production and taking notes process for students, proofreading for teachers...). Moreover, AI and automation allows us to save time that could be used in other activities to exert our humanity, or to focus on other essential things like relationships (evoked in France and Portugal). Another point is AI can release ourselves from repetitive or uninteresting tasks, that lead us to be able to focus on more profound tasks that need high intellectual activity and might be more interesting / stimulating. Automation can also be a mean to relieve teachers that are tired or when they have a health problem (punctually) – or relieve them from tiring tasks (permanently).

However, participants are also worried about the risk of cognitive impoverishment and loss of autonomy with AI. Automation supposed to delegate / be dispossessed of a certain knowledge (a *know-how*) and to become machine-dependant, thus we are certainly losing autonomy when we are not able to realize a task without a machine or by ourselves. Moreover, by freeing ourselves from a task, we no longer call upon the cognitive capacities that enabled us to carry out this task, we no longer call upon the cerebral areas (like it is the case with the systematic use of GPS that impoverishes activity of cerebral areas associated to space orientation and memory) we need for this action / realization of the task. On top of that, certain cognitive faculties need practice to be developed (such as resolving a problem, creativity...), notably by trial-error as we are also learning from our mistakes, thing that AI doesn't make possible if we are always relying on it for the right answer. And finally, sometimes, even if certain tasks are uninteresting or of "lower level", some of them are holding a lot of values (such as patience, maturity...) or they are important for the development of cognitive faculties.

Ideas from local and global synthesis mobilized in this nexus of complexity:

- [\(Education – Global\) Using AI and NS to better teach and learn](#)
- [\(Education – Global\) Using AI to release human from work](#)
- [\(Education – Global\) Using AI to improve performance and innovation](#)
- [\(Education – Global\) Preserving the fundamental needs required for the human \(cognitive\) development](#)
- [\(Education – Global\) Preserving human autonomy](#)

## Improving our understanding of the human being while not giving in ontological reductionism

In France and in Portugal, participants highlighted that advances in neurosciences and AI are expected to be able to identify students with learning difficulties notably through neuroimaging and diagnosis. This will allow to support students and intervene earlier to prevent negative consequences such as low self-esteem. A better awareness of neurodiversity and identification of student's learning difficulties and/or mental pathologies can also lead to adapt learning tools and systems for student, as allows personalization and AI algorithms.

However, participants expressed that labeling children with name of mental pathologies or learning difficulties can also lead to discrimination and stigma, and this would be detrimental for the person. In Portugal, participants underline that a better identification of children with low or high cognitive faculties can lead to overfocusing on cognitive performances, to overstimulate or understimulate them with the belief that there is no possibility of improvement and change.

### Ideas from local syntheses mobilized in this nexus of complexity:

- (Education – France): Fostering self and other-understanding thanks to NS and AI
- (Education – France): Taking care of not reducing persons to categories
- (Education – Portugal): Scientific and/or technological innovations are beneficial to education
- (Education – Portugal): Overvaluing children's cognitive abilities may be harmful