

Inclusive Education based on the 9-Layered Model of Giftedness and the Role of Digital Technologies.

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Abstract We present a pioneering framework in the field of education based on inclusive teaching and learning practices and techniques in the classroom. Adaptable and immersive learning experiences centered on the enhancement of cognitive skills throughout the school curriculum can provide a positive whole school ethos. The current framework as a product of transdisciplinary research in ICTs, Cognitive Science and Education sets the example for the implementation of blended learning environments, combining both physical and virtual learning experiences to set the ground for inclusive and flexible educational curriculum.

Keywords —smart learning environments, school ethos

I. Introduction

While some EU Member States have taken steps to incorporate cognitive skills in curricula, this has not been done consistently. Lifelong learning, social inclusion, active citizenship and employment are EU pillars that can be realized through embracing cognitive skills in education. The 9-Layered Model of Giftedness is a holistic framework that can serve as a cornerstone that explains how cognitive skills are related to inclusiveness at school as well as it connects higher cognitive skills to a cross-curricular teaching methodology. In addition, active and constructive learning experiences promote higher cognitive skills leading to students' improved cognitive and academic background. Furthermore, training in higher cognitive skills is addressed to the entire school community, teachers included, thus making education the step towards active citizenship as well as healthy and active aging (Drigas, Karyotaki & Skianis, 2017, p. 11).

Technologically enhanced learning can support both personalized, interactive, engaging learning experiences and constructive teaching methodologies. More specifically, ICTs can set the ground for the creation of a smart learning environment that can capture visual, auditory and physiological data through sensors to monitor the learning procedure and make decisions that can improve lessons in real-time. In a broader view, immersive technology can assist in the combat against student or teacher burnout in combination with bridging the gap between students from several cognitive and social backgrounds. However, despite the aforementioned opportunities, these technologies have not been integrated in education on a large scale, mainly due to the lack in infrastructure and the innate difficulty to capture and use sensitive data, originating from children (Joshi, Rambola & Churi, 2021, p. 3).

II. Upskilling the school community

A reform in education and training in EU Member States as well as a change of mindset in EU citizens and organizations can begin with the implementation of training students, teachers and parents how to grow their mental abilities (Cinque, Carretero & Napierala, 2021, p. 13; Carr, 2021, p. 34).

More specifically, the 9-Layered Model of Giftedness is founded on the importance of higher cognitive skills in learning in combination with self-efficacy beliefs as well as self-regulation skills, such as being able to monitor ourselves, self-reflect and have self-control (Drigas, Karyotaki & Skianis, 2017, p. 11). Our model explains how attentional control (selective, sustained, focused attention) as a metacognitive skill has a direct impact on one's behavior, effort and persistence (Drigas & Karyotaki, 2019, p. 179). Also, we point to the role of educators and teachers as constant inspiration for their trainees and students in a dynamic, reciprocal interaction that forms the latests' personality and learning capacity. Teachers' beliefs in their personal efficacy to motivate and promote learning can assist in forming a qualified learning environment, wherein students can achieve high-level academic results (Bandura, 1993, p. 119). However, it seems that teachers are less confident in their ability to articulate their professional knowledge (Maciver, Hunter, Adamson, Grayson, Forsyth & McLeod, 2018, p. 1709).

Moreover, we argue that teachers and parents' personal development is innately related to a society founded on social equity and social sustainability. Inclusiveness is a construct of several cognitive, metacognitive skills as well as self-beliefs and values that can be infused into the community, by creating inclusive strategies at schools. An inclusive school affects school functioning as it has a direct impact on the school climate (Maciver, Hunter, Adamson, Grayson, Forsyth & McLeod, 2018, p. 1712). More specifically, there are seven aspects regarding a school's level of inclusivity (McMaster, 2014, p. 44): Teachers and students learn at school through building a society of knowledge and skills, teachers believe that all students in school can be successful, teachers regularly reflect on ways of improving students' learning, strategies set for students are consistently upheld across the entire school, extra-curricular activities provide valuable opportunities for tailor-made learning opportunities, teachers share similar beliefs and attitudes about effective teaching and learning and the staff has a commitment to the whole school and not just their class.

The aforementioned relation shows the significance of schools' fostering positive and purposeful relationships throughout the school community. There is a bidirectional relation between values and culture, thus our values influence our culture and vice versa (Hossain & Ali, 2014, p. 131). More specifically, by having the "right" values we set the standards for changing culture and then, develop inclusiveness in school policies and practices. The 9-Layered Model of Giftedness provides an integrated approach towards improving human mind and behavior, encompassing both the skills and the personal characteristics (personal virtues, values, motivation) necessary for achieving one's personal happiness and the happiness of others, as well. Especially, a civilization that is characterized by ideals such as social equity and solidarity, harnesses inclusiveness among all citizens. Therefore, lifelong learning skills can induce the values, knowledge and skills to achieve social equity and solidarity. Such values and skills entail persistence, patience, endurance, self-improvement, self-knowledge and they are connected to personal and societal prosperity (Drigas, Karyotaki & Skianis, 2017, p. 12).

Aristotle explained that if humans acquire certain virtues and skills, such as prudence, volition, judgment, memory, perspicacity, foresight, then they could discern right from wrong and try to maintain it, in their whole life. Moreover, he noted that perception is the key to higher cognitive skills, originating in one's ability to apply his or her knowledge to new experiences (metacognition). All the aforementioned skills compose Aristotle's character excellence (Kyle Brandon, 2010, p. 43).

Sternberg's Triarchic Theory of Intelligence encompasses Analytical, Practical and Creative Intelligence. Analytical Intelligence entails cognitive and metacognitive processes, such as

knowledge acquisition, planning, monitoring, evaluating as well as self-monitoring, problem solving and decision-making. However, this type of intelligence is merely measured through quantifiable, academic criteria. Practical Intelligence places emphasis on deploying one's knowledge in everyday situations, while conceiving knowledge through observing others. Finally, Creative Intelligence comprises innovative ideas and aspiring inventions and designs by combining several experiences and previously acquired knowledge (Tigner and Tigner, 2000, p. 171).

Sternberg also suggested that intelligence is affected by both environmental and/or intrinsic factors, such as lack of motivation, lack of impulse control, lack of perseverance, fear of failure, procrastination, inability to delay gratification, too little or too much self-confidence. 9-Layered model of Giftedness suggests that adaptability and emotion regulation are top-level cognitive skills affecting one's behavior and the potential for personal success. Moreover, they are both reflected on a person's individual experiences as well as on his or her own capacity to learn from other people's experiences. Therefore, a student's or a teacher's success is linked to his or her capacity to use and develop all types of intelligence (Sternberg, 1996, p. 4).

9-Layered model of Giftedness also emphasizes lifelong learning skills and the way they can be integrated in the promotion of teachers' cognitive and mental health. Lifelong learning is especially tied to cognitive flexibility and self-regulation skills. Cognitive flexibility refers to the ability to shift between response sets, learn from mistakes, devise alternative strategies, divide attention and process multiple sources of information concurrently (Drigas & Karyotaki, 2019, p. 92). Consecutively, lifelong learning as a top-level metacognitive skill reflects the ability to reach personal and professional success in a holistic sense, linked to a balance among physical, cognitive and mental health. Thus, cognitive training can lead to upskilling teachers' cognitive and emotional components in terms of promoting their cognitive, emotional and social well-being synergistically (Drigas, Karyotaki & Skianis, 2018, p. 11).

More specifically, lifelong learning enhances self-efficacy beliefs and motivation as a protective factor against teachers' burnout (Drigas, Karyotaki & Skianis, 2017, p. 4). When our body is experiencing stress, we go into a flight-or-fight mode to protect ourselves. Our amygdala signals our hypothalamus to increase our heart rate, heighten our senses, generate heavier breathing, cause greater oxygen intake, increase cortisol levels and finally, rush adrenaline into our system (Schiller, Ben-Shaan & Rolls, 2021, p. 22). While this response is certainly important, when we are under chronic stress, we are driven to chronically increased cortisol levels. This can wear our brain down, interrupt the vagal tone, disrupt synapse regulation, impair brain function and compromise our mood (Glad, Andersson-Assarsson, Berglund, Bergthorsdottir, Ragnarsson & Johannsson, 2017, p. 1).

Therefore, prolonged exposure to stress has a detrimental impact on the prefrontal control over amygdala activation, thus it leads to deficits in emotion regulation, such as in case of fatigue, anxiety disorders and depression (Arnsten, 2009, p. 410). In addition, this vicious cycle of a stressful state over safety can increase the risk of mental health issues, such as dementia, Alzheimer's disease and other neurodegenerative diseases (Justice, 2018, p. 127). Therefore, by training teachers' metacognitive skills we look after their amygdala-prefrontal cortex circuitry and indirectly enhance their mental health (Drigas & Karyotaki, 2017, p. 220).

As the 9-Layered model of Giftedness is a holistic construct, it is centered on students' and teachers' physical, cognitive and mental health by proposing a way of life based on mindfulness living, in which a community of knowledge, communication and trust are indispensable qualitative characteristics. Healthy individuals that become successful professionals, carrying

more positive feelings than negative feelings play an eminent role in the sustainable development of all countries and communities.

III. How can ICTs assist in the implementation of Inclusive Education?

Knowledge society's characteristics, such as lifelong learning and personalized learning have grown the need for smart learning environments. By smart learning environments, it is suggested that digital and physical learning elements are integrated into hybrid learning methods driven by IoT to offer proactive, tailor-made support to learners. Moreover, learning assistants are able to identify user's current learning situation based on historical data and context recognition. Thus, the design and development of such learning environments originate in inclusive educational policies and principles (Freigang, Schlenker & Köhler, 2018, p. 5).

Digital and mobile devices, sensors and actuators, along with cloud computing, learning analytics, artificial intelligence as well as augmented and virtual reality are the technological means to support a smart learning environment (Cheung, Wang & Kwok, 2021, p. 2). In addition, conversational intelligent tutoring systems offer improved interaction among the interested parties, students and the conversational agent in a natural language resembling the dialogic form of learning, occurring in the classroom (Oliveira, Galvao de Barba & Corrin, 2021, p. 2). Furthermore, smart learning environments can certainly assist low-cost ubiquitous, distance learning programs for counterbalancing the social issues originating from the pandemic of Covid-19, such as increasing employment and inclusion (Martínez, Jacinto & Montiel, 2021, p. 11).

A transmedia educational project for everyday activities was launched to address the needs of typically developing preschoolers and first grade students in elementary schools as well as their peers with special educational needs and/or disability. It is a smart learning environment in terms of its capacity to differentiate its level of difficulty and thus, leverage the capabilities of all students in class so as to enhance inclusivity. The two levels of difficulty were decided based on the principle of equity and interactivity so that no student is excluded from the learning process (Kaimara, Deliyannis, Oikonomou & Fokides, 2021, p. 1).

The effect of a fully online flipped class on students' learning performance was evaluated based on the 5E framework (Engage, Explore, Explain, Elaborate and Evaluate). The results showed that the online flipped classroom approach can be as effective as the conventional flipped classroom approach (Hew, Jia & Gonda et al., 2020, p. 3). In addition, communication and collaboration are prerequisites of learning processes taking place in smart classroom environments with multiple educational benefits centered on higher-order thinking skills. This active learning process can not only help students gain new knowledge, but also cultivate their cognitive, behavioral, and emotional skills (Cheung, Kwok & Phusavat et al., 2021, p. 1).

Smart learning environments, thus, entail a personalized learning context, wherein real-time adaptive assistance to the learners can be provided. The pedagogical and technological issue involved in such personalized learning environments is to be able to provide real time learning experiences to the users by adopting flipped classrooms, massive open online courses, gesture-based learning, educational robots, augmented reality, virtual reality and game-based learning. However, such learning environments presuppose the possession of computers in the classroom as well as the capability to access the internet for all students, teachers and instructors (Naidu, Lako, Dayal & Patel, 2021, p. 10).

IV. Conclusions – Discussion

Concluding we underline the importance of the digital technologies in education domain and especially in gifted and special education, that is very productive and successful, facilitates and improves the assessment, the intervention and the educational procedures via Mobiles which brings educational activities everywhere [40-52], various ICTs applications which are the core supporters of education [53-86], AI, STEM & ROBOTICS which raise educational procedures into new levers of performance [87-100], and games which transforms the education in a very friendly and enjoyable interaction [101-108]. Additionally the enhancement and combination of ICTs with theories and models of metacognition, mindfulness, meditation and emotional intelligence cultivation [109-175] as well as with environmental factors and nutrition [36-39], accelerates and improves more over the educational practices and results, especially for gifted and Students with Special Educational Needs.

Moreover, 21st Century Skills focus on higher-order thinking, problem solving, effective communication, self-directed and collaborative learning required by a global and digital society (Cinque, Carretero and Napierala, 2021, p. 13). It is suggested that schools should respond to the 21st Century Skills that are needed for students to participate in society and in future employment. This points to students being empowered to actively make choices and to take responsibility for their own learning (Utterberg Modén, Tallvid, Lundin & Lindström, 2021, p. 1540). The shift from the traditional instruction, which reproduces the knowledge, to the interaction that encourages learners to discover, experiment and construct their own learning experience is considered the cornerstone of 21st Century skills.

In the meantime, smart learning environments are characterized by flexibility, effectiveness, efficiency, engagement, adaptivity and reflectiveness (Kaimara, Deliyannis, Oikonomou & Fokides, 2021, p. 1) through the use of digital and mobile devices and sensors, cloud computing, learning analytics, artificial intelligence and augmented and virtual realities (Cheung, Wang & Kwok, 2021, p. 2).

They also facilitate personalized learning, adaptive learning, intelligent tutoring, open online learning, blended learning and collaborative learning opportunities, such as digital storytelling, serious games and other interactive tools (Agbo, Oyelere & Suhonen et al., 2021, p. 2). In addition, peer interaction and learning motivation has a direct impact on higher-order thinking skills (Cheung, Kwok & Phusavat et al., 2021, p. 1).

Under the aforementioned framework and the KA3 Project “Teachers4Europe”, our school had multiple deliverables during the school years 2019-2022. First of all, our students had the experience to design and create a conversational agent that understands and replies to a natural language. Our students had to use their creative and critical skills as well as their digital skills to come up with an interactive, digital tool available to their fellow students. The design of the chatbot was founded on the dialogic form of teaching by Socrates. The answers given to this rule-based chatbot were various, thus depicting the importance of higher cognitive skills in a dialogue. As a second step, our group of students made an inquiry among their fellow students’ level of transferable skills. Students made a review study on the transferable skills of the 21st Century and they ended up in forming a self-report questionnaire centered around the following skills: organization/planning, collaboration/communication, creativity/critical thinking, respect/self-respect, responsibility and solidarity/empathy. After statistical analysis, the questionnaire was validated and a

profile concerning students' 21st Century skills in our school was developed, including both their strengths and weaknesses. Finally, a parallel study took place in the current school year concerning the intangible cultural heritage in Greece. Our students traced the diverse elements of our intangible culture starting from their hometown and they created a digital, interactive map of Greece, where they pinned a document referring to an intangible cultural element of their place of origin. Such cross-curricular activities build on students' global citizenship and sustainable living with the aim to address the Sustainable Development Goals by 2030 of the United Nations.

In this framework, a just and fair society can be built on the grounds of a community of teachers and students sharing knowledge and skills with the aim to serve a common purpose: being global citizens with respect towards other people and the environment. The values and virtues as well as the abilities and skills necessary to maintain personal welfare and societal prosperity are transdisciplinary and presuppose inclusiveness in education, encompassing equal opportunities for all students, regardless of physical or social impairment. The 9-Layered Model of Giftedness encompasses global values and skills affecting students' and teachers' everyday activities and choices.

V. References

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