



(Co)Creation & Interaction at the Crossroad of Art, Technology & Special Education. Experimental Workshop with the @Postasis Real-Time Multiuser Collaboration Platform

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Abstract

The covid-19 pandemic highlights the need to exploit and upgrade distance education structures. During the last 28 months, our workgroup has been studying and developing an advanced platform towards distance education in Digital Arts, enabling real-time collaborative creation and interaction. The @postasis platform, developed under Erasmus+ @postasis: Virtual Artistic Laboratory project (apostasis.eu), enables setup of educational multi-participatory sessions, linking virtual entities, Internet-of-Things constructions (IoT), and humans (e.g. avatars, observers, performers), in the globally interconnected physical and virtual space. It incorporates technological functionalities and specialized methodologies, in a composite and creative way, enabling a wide range of educational actions (courses, workshops, seminars) and large-scale exhibitions. These methodologies, even though they mostly target art education and have been applied to different levels of it (secondary, higher), they have the potentials to be applied, also, to special education. One such case is the experimental workshop “(Co)creation and interaction for special education”, based on the “Creation of the world” methodology of @postasis. It took place between students of the Department of Special Education of the University of Thessaly (Greece) under the supervision of the Instructor Dr. Anastasia-Zoi Souliotou, and @postasis workgroup members from the Athens School of Fine Arts (@postasis coordinator) namely Professor Manthos Santorineos and Instructor Dr. Stavroula Zoi. The students experimented, based on @postasis platform, on how they could exploit emerging creative technologies and distance education concepts, towards including people with disabilities in new forms of educational activities. Individual phases of the workshop are analyzed: collages creation based on physical materials with discrete haptic properties, transfer of materials and their properties in @postasis virtual space as textures, mapping of space, and creation of virtual entities (avatars, NPCs) ‘dressed’ with physical drawings, and potentials of adding IoTs for enhancing interaction. Each of the above creative phases also included a real-time multiuser session for jointly experiencing the potentials of a multi-sensory experience inside such a space. This experiment highlighted the need to make special education students aware of concepts in the intersection of creative technologies and distance education, for further investigation. As this constitutes an emerging research topic, thoughts for the future are presented.

Keywords: *visual arts, digital art, distance education, special education*

1. The need for human centric, customizable real-time collaboration platforms

The covid-19 pandemic highlights the need to exploit and upgrade distance education structures. Existing distance learning platforms emphasize mostly on asynchronous procedures that transfer the real classroom to the virtual space (e.g. share screen that corresponds to a “virtual blackboard”). On the other hand, multi-user, real-time platforms mainly target gaming or industrial applications (e.g. design industry) where each participant has a limited and specialized role. There is a need for platforms that use elements from the above fields, but enable to envisage new forms of education, enabling instructors of different levels and fields of education to parametrically define their own educational sessions, based on the targeted students-participants. As more and more people get familiar with distance learning, is there a need to upgrade involved technologies and methodologies? @postasis investigates this question through the definition of a suitable platform.

2. @postasis educational methodology

@postasis platform (apostasis.eu) enables the setup of educational multi-participatory sessions, linking virtual entities, Internet-of-Things constructions (IoT), and humans (e.g. avatars, observers, performers), in the globally interconnected physical and virtual space. @postasis is a framework



combining a technological platform with educational methodologies that could be customized for different levels and fields of education.

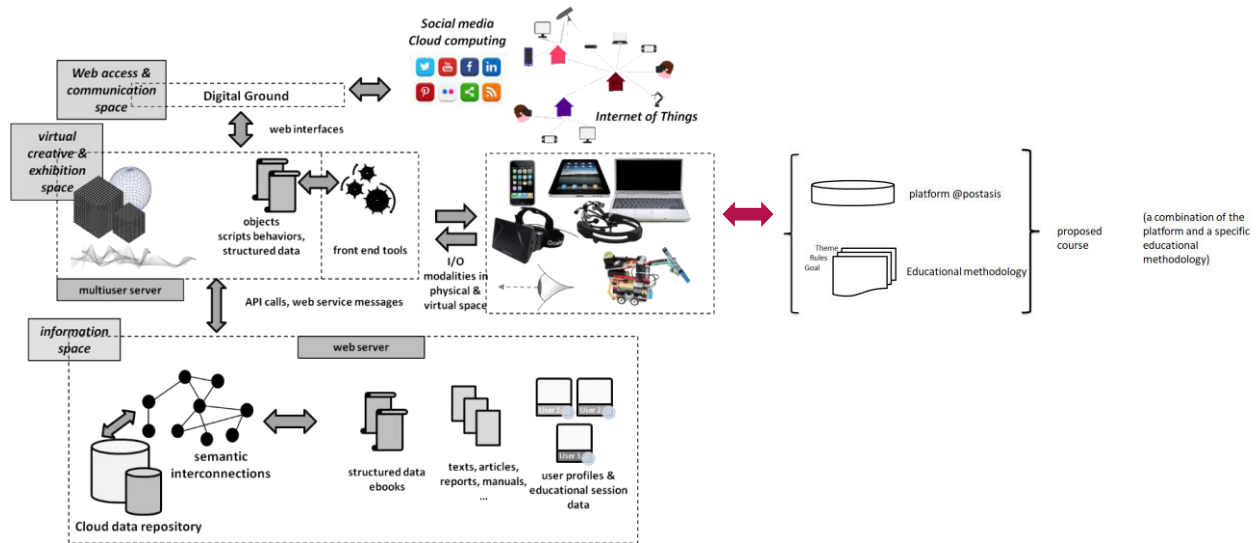


Fig. 1. @postasis platform architecture

3. Inside @postasis: educational project “Creation of the world”

@postasis incorporates technological functionalities and specialized methodologies, in a composite and creative way, enabling a wide range of educational actions (courses, workshops, seminars) in different fields of education. Those methodologies mostly target art education and have been applied to different levels of it (secondary, higher, collaborative art project) [1] [2] [8] [12].

However, they also have the potential to be applied to students of special education. One such case is the experimental workshop “(Co)creation and interaction for special education with @postasis platform” described in this paper [1] [2]. It exploits “Creation of the world”, a specialized methodology of @postasis targeting school teachers or people not familiar with technology, adjusted here for special education. More precisely, @postasis multisensory nature in combination with distance communication should benefit people with visual, hearing or motor impairments, deaf people and people with intellectual disabilities.

According to this methodology, students are encouraged to collaboratively create a multiuser virtual space inhabited by avatars and Non-Player-Characters (NPCs), based on the following axes: *I create an ecosystem. I create a society. I build in the empty space and create new spaces. I create heroes and give them life. I create heroes and give them behaviors.*

The heroes have the shape of a cube, so that no advanced modeling knowledge is required. They are recognized externally by the different shapes and colors/materials painted or put on their surface.

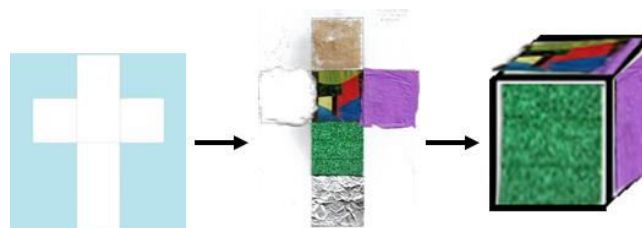


Fig. 2. Texture mapping of @postasis cube NPCs

Practically, this is analyzed to the following steps, taking place inside the @postasis platform: a) Construction of space and heroes (avatars, NPCs, IoT mechanisms), b) definition of characteristics and behaviors (action, movement, goal), c) observation of the society of virtual entities and avatar intervention, d) communication with written messages (chat).



4. The chance to widen experimentation in special cases of education

Educational experience has highlighted the need to widen experimentations at the crossroad of art, technology and special education. Special education students should be made aware of concepts in the intersection of creative technologies and distance education, in order to be prepared for new forms of education, towards students with disabilities.

As the arts enhance self-expression and creativity in a liberal way, they help to overcome difficulties of students with or without disabilities in Science, Technology, Engineering and Mathematics (STEM) by enabling them to deeply understand complex notions, e.g. fractions and abstract concepts [4]. According to Zayyad students with specific learning disorders (SLD) should benefit from the inclusion of the arts in the learning process through the alignment of STEAM (Science, Technology, Engineering, Arts and Mathematics) education with the UDL (Universal Design for Learning) model [11].

From the reverse point of view, the bibliography also highlights the importance of broadening the use of multisensory technologies for art and other creative activities for all students. Multi-sensory learning enabled by technologies helps to adjust to the preferred learning styles of students with special needs and/or disabilities, as for example in the case of technologies for the visually impaired and for people with learning disorders. [9]

Learning is expected to reposition or change relationships among human participants and the tools in a certain context [6]. It also provides us with new abilities for participation, belonging and experiencing our world [10]. Furthermore, the current shift to the age of empathy where organizations aim at dynamically reaching out and providing meaningful experiences of exchange and co-creation in the wider context of the society [5], underlines the need for an interactive, participatory and dialogic art [7]. This, in turn, calls for the inclusion of different publics and audiences embracing those with special needs.

@postasis platform focuses on these learning objectives by enabling students to be engaged in a learner-centered and active learning process where creation and interaction take place in a common arena of sharing experience and exchanging ideas.

During the lessons before @postasis seminars, students had created collages in order to explore visual and haptic qualities of different materials. The emphasis was placed upon different textures that facilitate recognition of different forms which is very important for all people, but also for people with special needs (especially with visual impairment). Several of these collages were then used to compose the ground of @postasis multiuser space (Figure3).

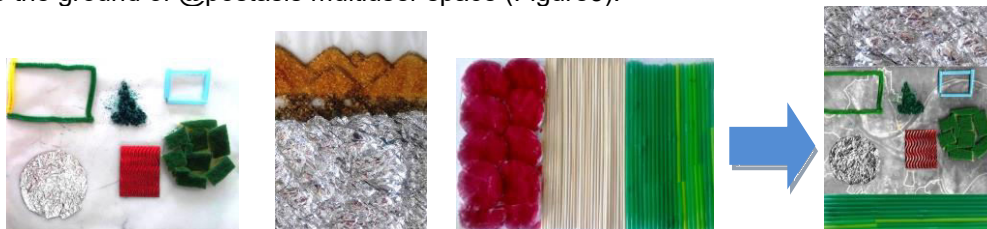


Fig. 3. Students' collages compose the ground of @postasis digital platform.

In the first @postasis seminar students of special education were introduced to the concept, structure, and features of @postasis platform. Afterwards they created their own drawings, collages and mixed media techniques on A4 cube avatar templates. They came up with interesting aesthetic results using various materials and techniques. Their drawings were used as textures of the cube avatars and NPCs of @postasis (Figure 2).

At the second seminar, students entered @postasis platform for the first time. They were impressed to see their own drawings, originally made on paper (handmade), to be transformed into cube-shaped entities (avatars and NPCs). Similarly, they were impressed by the ground transmitting their own handmade collages in digital space (Figure4).

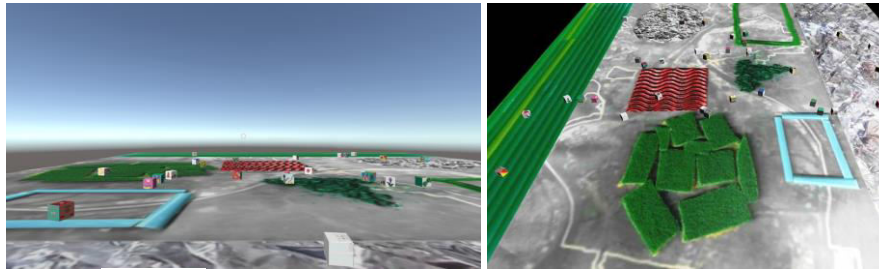


Figure4. @postasis platform's screenshots in digital space.

Through avatar interaction and real-time chatting they deepened to concepts involved in such a space (e.g. different perspectives, how senses from physical space are transformed into the virtual space). At the third @postasis seminar students were introduced to the editing space of @postasis platform. They were shown how to define the main entities: space, avatars, NPCs, and how to assign their handmade materials to each of these entities. One of the most important aspects was to explain how the behaviors of NPCs are defined through code and how they could create emerging behaviors through variations in their parameters (Figure 5). Predefined behaviors of @postasis platform, such as the stroller (flâneur), the follower, or the entity leaving traces were setup with different parameters. During this seminar students of the University of Thessaly (Volos, Greece) interacted with students and researchers from the Athens School of Fine Arts (Athens, Greece). The students had the chance to observe this evolving world from God's view and from avatar's view (Figure 6), and interact with space (e.g. activating sounds assigned to certain materials) and NPCs.

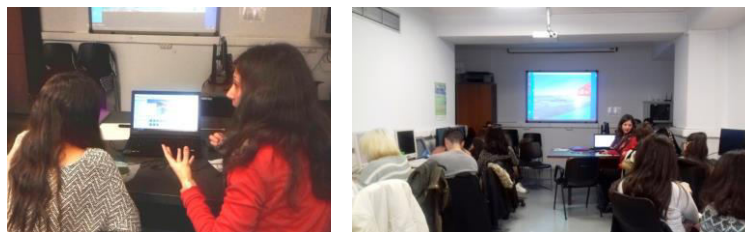


Fig.5. @postasis seminar in the creation of avatars and multisensory space

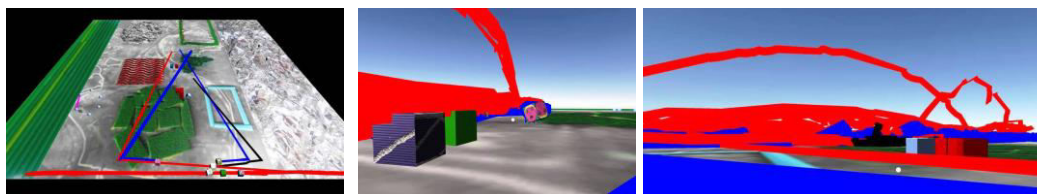


Fig.6. Screenshots from God's view and avatar's view (person's view)

The synergy of different materials, media and art forms through the combination of traditional art with digital art dynamically disseminates the creative energy to different audiences rendering art a core element which actively connects with popular culture as well as with media culture and internet culture [3]. The unification of forces of different media and techniques in the (co)creation and interaction for special education workshop expands to the multisensory nature of @postasis platform involving not only vision, but also other senses: sound through sound triggers and touch, which was indirectly indicated in a mediated way through the sounds created by human intervention in a way that reveals the texture of the material.

As far as special education is concerned, a learning objective of utmost importance was to think about possibilities and ways of using @postasis platform with persons with special needs. Its multisensory nature should render @postasis platform accessible to different audiences embracing those with special needs. More analytically, the activation of sounds, the possibility of real-time communication with written text through non verbal chatting, the indirect (or direct through the Internet of Things) implementation of touch, as well as the possibility of distance communication, (co)creation and interaction are expected to facilitate participation for people with special needs and/or disabilities.



5. Conclusions and next steps

The experience of (co) creating and interacting in @postasis platform rendered the students of Special Education Department of the University of Thessaly active creators of a new digital multisensory world. @postasis platform's inter-media and multisensory nature is expected to be exploited in special education through participation of people with special needs and/or disabilities. This constitutes a topic with possibilities for further investigation at the crossroad of art, technology and special education. Further developments of the platform, e.g. by using the Internet of Things (IoT), are also expected to highly enhance participation and inclusion.

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