SimAULA. Training our teachers through innovative methodologies based on serious games

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I. Abstract

SimAULA is a European Lifelong Learning Programme project aimed at offering a virtual medium for initial and lifelong teacher training. The project's originality lies in the tool that its participants have designed, a simulation of the serious game variety which enables users (teachers in training, in this case) to put their skills into practice in an environment that faithfully recreates the reality of teaching. Additionally, as a simulation, SimAULA makes it possible to avoid the negative consequences that teachers' actions could have in the context of a real classroom. Possibilities for SimAULA's future development include enabling users to customise teaching scenarios, so that classroom activities can be steered towards work related to different values or ethical or social issues of interest within a given curriculum.

II. What is SimAULA?

One of the main goals of Europe 2020, the European Union's growth strategy, consists of taking advantage and making active use of all kinds of modern technologies to improve the quality of education. In that regard, the development of simulations and of the even more innovative serious games is a very useful and realistic way of dealing with the expectations and needs that students encounter in today's societies. The use of virtual reality and all the software related to it has increased exponentially in recent years. Many researchers have specifically stated that learning in simulated environments has a positive effect on motivation in the learning process, as well as on the development of practical professional skills, while the natural characteristics of such virtual learning environments are conducive to students' cognitive and emotional development (1,2,3,4).

The use of simulations and role play in education can no longer be considered entirely innovative, but the challenge of applying such simulations to specific areas of educational practice remains wide open. The role of serious games to support active learning by engaging students and encouraging them to involve in research,

experimentation and collaboration with peers has been widely stated by many researchers (1,5,6,7). Similarly, Gibson (8) explains that serious games contribute to the engagement of future teachers by developing several types of skills, especially since they can be exposed to a great variety of scenarios or situations where to put these into practice (6). Our case, for example, concerns teacher training programmes. In Europe, teachers involved in such programmes are required to participate in practicums, i.e. to spend a certain number of hours in real schools, gaining real practice or experience. It is not always easy to find placements in suitable schools for so many teachers, and that is what gave rise to the idea for SimAULA, as a means of offering a 'virtual practicum' in a realistic, 3D, simulated world mirroring an authentic school context as closely as possible.

When using the SimAULA platform, the teacher in training controls an avatar that interacts with student avatars (controlled automatically by SimAULA) in a virtual classroom, where lessons are taught and a series of situations liable to arise in a face-to-face environment are played out. By way of a specific example, the first version of SimAULA features a simulated biology class in which the teacher avatar has to help student avatars fulfil various learning goals.

As might be assumed, SimAULA requires a model for its student avatars' behaviour and reactions to the teacher avatar's decisions. Another factor in the platform's complexity is its scope for applying different teaching strategies, assessment types, classroom structures, resources, etc. All those elements made it necessary to carry out an in-depth initial study of pedagogical and psychological aspects in play in classrooms. Even so, given the tremendously complex nature of human psychology and the practice of teaching, the resulting model represents only a small range of the possibilities that exist in a classroom.

New technologies applied to the creation of serious games are the main resource used to stimulate and motivate SimAULA's users. The simulation provides an entertaining way for teachers in training to practise using their skills in various learning contexts, while avoiding the consequences to which inappropriate decisions could lead in a physical environment. As suggested by Rieber (3), this power of serious games to motivate makes them a good tool for learning.

SimAULA can be used for initial and lifelong teacher training alike.

III. The vital role of the teacher in transmitting values in the classroom

The teacher as a value transmitter

The school and teachers have always been expected to form a value system in adolescents by the state, society and individuals. Part of these values are universal, others – of regional, national or community significance. The educational institutions

and agents use various approaches and methods for transmission and formation of values, which could generally be divided into two groups: 1) purposeful and planned (explicit) or 2) unplanned and spontaneous (implicit).

1) Among the cannels for explicit value transmission the following could be included:
- The curriculum – special subjects are devoted to character education and value formation. It is also possible that different topics in different subjects deal with moral or ethical issues as well as other aspects of character education.
- Extra curriculum activities; Special activities are organised in extracurricular time in various forms for the formation of attitudes and feelings in unison with the socially significant values.
- Special teaching/learning methods and activities are organized in practicing 'good behaviour' through role play for example

2) Implicit (invisible curriculum) value transmission cannels
- The classroom settings/environment – the way in which the physical learning environment is designed to reflect the possibilities of implementing group and individual activities and formation of collaborative skills. Research has shown that collaboration activities form mutual concern in students for one another, acceptance of students with disabilities and difference racial and ethnic background. The classroom can have art or various artefacts displays with significance for values transmission etc.
- Through the role models and the positions the teacher takes in her relationships with the students she conveys ethical principles and values as well. In the words of D. Titus 'Teachers, as good role models, who set a positive example and share their convictions on core values can have a positive effect on their students. Skills include how to resist peer pressure, maintain self-respect, resolve conflicts in nonviolent ways, and stand up for what one believes in. By giving students opportunities to make choices and to respond to moral issues teachers allow students to apply the principles which they are learning." (9)
- Through the constructivistic teaching strategies and collaborative learning activities aiming at the development of core values such as compassion, courage, courtesy, fairness, honesty, kindness, loyalty, perseverance, respect, and responsibility (10)

Undoubtedly one of the main functions of the teacher is related to the formation of knowledge, skills and competencies in students, i.e. – their cognitive development. Explicitly or implicitly, however, the teacher is a transmitter of the public and own values in the classroom environment and with his/her role behavioural models has a significant impact (positive or negative) on the emerging personalities of adolescents. The important question here is whether universities prepare future

teachers adequately in order to play their role of values transmitters in a way, which positively influences the formation of good and moral citizens.

The preparation of the future teachers in their capacity of values transmitters – how does teacher practice contribute to the development of teacher skills in this area?

In order to fulfil their professional role as transmitters of social values and as a key factor in the development of the adolescent personality, teachers need to be prepared from theoretical and practical aspect.

The study, conducted within the SimAULA project in Bulgaria showed that in the curriculum for teacher training there is a segment, dedicated to character education. It is equivalent in volume and content to the segment of Theory of Education aimed primarily to the cognitive development of young people. Objectives related to the formation of a the students' personality– their behaviour, values and feelings, are embedded in the curricular practice plan for future teachers. Moreover, when planning their lessons, teacher trainees are required to set educational objectives as well as objectives related to the formation of various personality aspects of the pupils'. All teacher training programmes in Europe include such elements of knowledge, skills and competencies in one form or another.

G. Boneva (11) analyses the existing assessment criteria systems in Bulgaria with a view of the assessment of future teachers' lesson planning and implementation skills. In most of these systems the 'formation of values' together with the cognitive development is present as compulsory element of the lesson plans. A system for the assessment of future teachers' practical skills in the classroom include 'skills to build humane relationship between teacher and students'[1]and more specifically respect and friendliness in communication; sound requirements to students; selection skills in various situations; results-related responsibility; individual approach in relationships with students; encouraging students to be kind, tolerant, and build partnerships. In another set of criteria for lesson assessment one may find the following criterion: 'implementation of character education: setting and implementing objectives related to the whole student personality development including moral and ethical values,

 aesthetic and physical aspects of education.'

At the same time the ethnographic study on the key issues of practical preparation of future teachers carried out in the frame of the SimAula project showed, that the value aspects of pupils personality development are not in the focus of the practicing students when teaching in the classroom. The priority objectives for them lie in the cognitive area and their main efforts are focused on the knowledge transmission.

Objectives related to the values/character formation of the pupils appear to be the most difficult to implement in practical environment.

The interviewed students shared a lot of issues and concerns that accompany their practical preparation. One of the main problems appears to be the class discipline and the impossibility to deal with pupils'' problematic behaviour. The issues identified don't even touch the 'value transmission' aspect. Among the difficulties the students experience in the classroom are:

♦ difficulties with the application of innovative methods of teaching and learning;
♦ difficulties with the transfer between theory and practice.
♦ difficulties with the application of pedagogical approaches that would promote a variety of class tasks and activities. The practicing students prefer applying frontal teacher-centred approach in their teaching and engaging pupils in individual learning tasks. They avoid involving pupils in group tasks and do not often provide them with choices during class activities.
♦ difficulties in the application of approaches and activities which would promote individualization of the learning process.
♦ difficulties in helping pupils who are behind their peers. (12)

In other words the research revealed that some serious issues and difficulties are experienced in the practical preparation of future teachers who rank the formation of pupils' values as the least of the priorities in their practical preparation.

We can conclude that on the one hand, the formation of values is an important mission for each teacher while on the other, the way that teachers' practical preparation is structured and the issues embedded in that structure do not allow teachers to learn the appropriate strategies for the formation of the adolescent personality and be role models for transmission of values.

In this sense it is logical to seek new approaches for the development of such teacher skills, role models and strategies. In this aspect, what functions can take a virtual learning environment such as SimAULA to support such skills development having in mind the complexity and invisibility of the nature of human values and their formation?

SimAula as an environment for acquisition of role models supporting value transmission in the classroom

If we return to the above channels for transmission and formation of values, knowing the virtual practicum we can say that SimAULA could facilitate the development of skills in future teachers through:

- An appropriate selection of educational content and good examples of core human values;
- The design of the physical parameters of the classroom environment and by providing students with different choices – bearers of different values;

- Through personal examples and role models by the teachers – SimAula can present a wide selection of behavioural role models;
- The personal relationships with the avatar-students (in groups and individually) which can be designed or selected by the teacher trainees;
- Through mediation of students' communication – by selection of appropriate learning activities, requiring collaborative work;
- Through the possibilities that the virtual environment provides for reflection of the sequence and consistency of the selections of the above-mentioned teaching and learning elements, as well as for the evaluation of success/failure of these selections.

Thus, by practicing sequences of choices of educational process components and role models, future teachers can experiment on various approaches for the formation of values, without these choices having a negative impact on the adolescents or even on themselves.

IV. SimAULA's potential

The current version of SimAULA is intended to demonstrate that it is possible for part of teacher training to take place via a virtual platform based on a serious game. The aim is not to virtualise the lifelong teacher training curriculum in its entirety, as some of the learning that such training involves stems from direct contact with students and the experiences that arise there from. The current version of SimAULA thus has a number of limited functionalities, basically enough for the purpose of such demonstration. The platform's envisaged evolution encompasses a whole further range of possibilities that develop the initial concept behind SimAULA, paving the way for greater openness, customisation, control and collaboration. Work related to values takes on particular significance in the light of all our ideas for continuing to develop the platform, as a future version must enable any user to configure their own classroom scenarios by introducing their own curriculum, teaching strategy, student characteristics, etc. The ways in which our platform has the potential to contribute to work on humanistic and social aspects in the classroom are listed below.

Customising learning scenarios

The scenarios that SimAULA currently features have been preselected by those involved in the project, and the work that can be carried out via the platform is thus restricted to a very specific range of learning situations. Each of the scenarios in question includes scope for working with a particular teaching strategy (there are three in total), a student type, a set of learning activities, a set of resources for those activities, etc. All those aspects are only partially configurable. Furthermore, it is not possible for users to create a scenario from scratch, so they cannot design teaching scenarios that mirror their educational reality. With all that in mind, the first innovation in the pipeline consists of enabling anyone who wishes to use SimAULA to design

teaching scenarios of their own, reflecting the situation of their students, their school, their environment, their country, etc., as closely as possible.

Such customisation will also make it possible to increase the number of teaching scenarios available to the SimAULA user community. As such scenarios are similar for many teachers around the world, there is great scope for reusing them with very little effort. That will be beneficial in two ways. Firstly, professionals looking to design scenarios for trainee teachers' practicums will have a database of scenarios that they can modify or use directly. Secondly, trainee teachers themselves will have a wide range of scenarios to play with as they wish.

Reducing the need for physical presence in classrooms

As mentioned earlier, SimAULA is not intended to replace all the face-to-face training involved in practicums. Nonetheless, it does aim to reduce the need for teachers in training to be physically present in a real classroom during their practicum. Opening SimAULA up to a sizeable educational community will make it possible to increase the range of realities covered by the platform, thus reducing the number of situations that can only occur in a physical classroom environment.

Interoperability with other virtual training systems

There is currently a tendency towards interoperability (the ability for two tools or spaces to communicate and integrate with each other) where new technologies are concerned, a trend confirmed by the constant expansion and generalisation of certain standards for virtual training. In that regard, SimAULA should not be viewed as a platform that functions in isolation from a larger educational process. It is actually an element of a learning environment that, in turn, makes use of other spaces, tools, platforms, websites, etc. The platform's capacity to function complementarily with other systems must be looked at on a case-by-case basis in each educational context, but the general goal is for SimAULA to have standards that make it possible to open it up in such a way. We have to take into consideration, for example, that many social networks could contribute to the platform's development or facilitate the exchange of best teaching practices. Another very clear possibility where interoperability is concerned consists of enabling teachers in training who use a particular e-learning platform to record their sessions using SimAULA.

Introducing different types of teaching content and goals

Teaching content will have a bearing on the way SimAULA is used, and the platform must therefore allow users to introduce such content on the basis of a system that respects the way curriculums are organised in different countries, so that they can be

reused. In Europe, for example, the nature and the structure of such content are partially determined by the European Higher Education Area (EHEA), and respecting those aspects is a factor in enabling other teachers to use and contribute to SimAULA more meaningfully.

From student avatars to real students

In SimAULA, the teacher avatar is controlled by a real user and the student avatars are controlled by the system, based on its own algorithm. Structuring the game in that way means that trainee teachers can play it at any time, as there will always be virtual students present in the classroom. Nonetheless, we can also envisage a game mode in which real students are able to control the student avatars. Such a mode would require synchrony, but would have the advantage of greater realism, as having students with different levels of education controlling their own avatars would result in authentic student behaviour instead of conduct generated by a limited algorithm. Future versions of SimAULA could aim to offer such a game mode.

Increasing the complexity of behaviour, the student model, etc.

The algorithm that determines the behaviour of the student avatars in the current version of SimAULA is very limited. Six student types have been established, However, despite them having been identified through an in-depth classroom-based ethnographic study carried out as part of our project, the types in question are limited. Furthermore, we know that students switch between types, depending on their personal situation and the learning context. Greater complexity is thus required in terms of the student model, specific forms of student behaviour and their link with the teacher avatar's actions. To that end, it is necessary to open the database up to a global educational community so that it can develop SimAULA.

New teaching strategies

SimAULA currently features three teaching strategies, which constitute just a small sample of the vast number of such approaches used in classrooms today. As in the previous point, the teaching strategy database also needs to be expanded in line with the use made of SimAULA.

Collaborative platform, exchange of best practices

An essential aspect of developing SimAULA is that the platform should make it possible to compile best practices. That involves a specific space where such practices can be defined and even demonstrated in the form of ideal sessions

recorded using SimAULA. The platform will thus feature a social space for knowledge management to foster such an exchange.

Enhancing artificial intelligence

While the platform is being enriched by the contributions of an educational community, the system itself should include an artificial intelligence (AI) module that allows it to learn from all the game sessions played. Such a module would pave the way for making specific recommendations to players based on their training requirements or their progress in a session. It would also help to boost the student avatar algorithm's complexity and offer much more complete feedback on each player's performance.

Multiplayer mode

As a tool with great potential for intercultural work, SimAULA intends to enable users based in different parts of the planet to participate in the same sessions. There is also the possibility of a teacher from one country or social context interacting with a group of students from another, thus facilitating comprehension, as well as work on sociocultural aspects and all the values related to coexistence.

Open source

Opening SimAULA up to the innovations of a global community of users is the key to the platform's sustainable development. Additionally, as a tool for improving education and teacher training, SimAULA ought to be free to use.

V. Specific uses of SimAULA and other serious games for work related to values

A number of educational practices that take a global, intercultural, value-related approach to teacher training and can be used with SimAULA or other serious games and simulations in general are described below.

Creating specific scenarios

A teacher might opt to work on content of their choosing from their curriculum, to create a learning context more in tune with rural settings, to use a particular teaching strategy to fulfil learning goals, to teach in a classroom where all the students fall into the 'distracted and unmotivated' category, etc. The idea is for every teacher to be completely free to design teaching scenarios by combining the multiple pedagogical elements involved (goals, materials, technologies to be used, student type, etc.).

Viewing best practices (examples)

A practicum's most theoretical lessons could be complemented by viewing pre-recorded SimAULA sessions in which players have achieved optimal educational results. Additionally, the adoption of such best practices could be encouraged by integrating them into suitable knowledge management systems or social networks.

Working on interculturalism

The degree of openness and customisation which SimAULA offers as a platform makes it possible to design situations involving activities that require users to take value-related decisions in the classroom. A teacher's acts and behaviour in general are infused with certain values, which can be raised through the feedback that SimAULA provides. Being able to establish a model for student avatars by specifying their characteristics would allow for the creation of student profiles corresponding to different cultural backgrounds and their incorporation into a classroom, so that teachers in training could tackle situations involving interculturalism.

Including 'singular students' in classrooms

Many teaching situations are greatly conditioned by the presence of one or more students with special characteristics, who end up becoming the focus of most of the teacher's work. As indicated in the previous point, enabling users to design their own student model would pave the way for scenarios involving very specific profiles, increasing the level of work with particular teaching methods.

Exchanging best practices among teachers

Social tools integrated into SimAULA to one extent or another could be used to share videos of best practices corresponding to different scenarios. Videos would be a different, stimulating resource that would complement other, more theoretical resources currently used in teacher training courses.

Playing with pedagogical strategies or settings created by other teachers

SimAULA's playful and even competitive aspect raises the possibility of games or contests taking place between teachers or schools. For example, a teacher might suggest to others on their training course that they gauge their individual performance in a specific teaching scenario, or other participants might propose working on scenarios that they themselves have developed to their peers.

Training for teachers who live in remote locations or are unable to travel to placements for work or health-related reasons

As a general characteristic of the platform, SimAULA's virtual nature would make it unnecessary for users, especially those taking part in lifelong learning processes, to travel to a physical classroom in cases in which attendance is problematic for them.

Avoiding the risk that taking certain decisions in the classroom entails

The consequences of certain decisions made in the classroom can be considerable. In that regard, SimAULA can promote the design of specific teaching situations in which the teacher avatar has to make key decisions or choices entailing great responsibility, with the potential for major repercussions. That would be the case, for example, of many scenarios related to violence in the classroom, sexism, group bullying, etc. These are the situations for which it makes most sense to use simulations in education. Teachers could work through such scenarios in SimAULA before having to deal with them in a physical classroom for the first time. They would thus be better prepared for and would react more confidently to real situations of the kind in question.

Training teachers around the world

Due to its nature, SimAULA lends itself to the creation of global teacher training processes. For work related to values, it is absolutely possible and advisable to organise training in which teachers from different cultural contexts, countries, religions, social classes, etc., share goals and enrich the training process with their knowledge and personal experiences. The idea, in short, is to use SimAULA to boost cooperative work. It is necessary to understand that shared experiences are vital to teacher training against the backdrop of education in the global village.

Assessing the performance of teachers in training

The possibility of SimAULA saving all the sessions that anyone carries out using the platform will pave the way for those who assess teachers to do so based on data collected through SimAULA. In addition to it being possible to use the way a teacher in training performs in SimAULA as part of the process of assessing their skills, the various indicators the platform provides can be used to paint a picture of the results obtained by groups of such teachers in specific scenarios, and even to analyse those results on the basis of geographic area or other parameters. From that perspective, SimAULA is also a means of better understanding and improving educational practice.

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