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FOSTERING 21ST CENTURY SKILLS FOR FUTURE TEACHERS

Daniela Cretu (a)*

* Corresponding author

(a) University “Lucian Blaga” of Sibiu, Romania, daniela.cretu@ulbsibiu.ro

Abstract

Life and work in the 21st century demand specific skills from students in order to be successful. It is the school's and the teachers' responsibility to prepare all children for the educational demands of life and work, in a rapidly changing world, by equipping the students with the required skills. This study focuses on four skills: creativity, critical thinking, communication and collaboration, which are part of the 21st Century Skills. If teachers are expected to enable the students to use such ways of working and thinking in the 21st century, then teacher preparation programs should offer multiple opportunities for teacher candidates to learn, develop and practice these skills. The article reveals ways of integrating the four mentioned skills during a Theory and Methodology of Instruction course, provided within a pre-service university study program for pre-primary and primary school teachers. The teacher candidates experienced training situations associated with each skill, and then, they were challenged to design such learning situations themselves, within an environment provided by interaction with peers. The teacher candidates' perceptions of their teaching and learning activity related to the four skills are analyzed.

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Keywords: 21st century skills; communication; critical thinking; collaboration; creativity; teacher preparation programs.

1. Introduction

Education in the 21st century is profoundly affected by changes in society: globalization, technology, labor market dynamics, immigration etc. Educational systems around the world are looking for best practices to prepare children and young people in schools today to cope with the life and work increasingly complex requirements of the 21st century. The life and work styles of the 21st century demand a certain skills set from students. It is the school's and the teachers' responsibility to prepare all children for the educational demands of life and work, in a rapidly changing world, by equipping them, the students, with the required skills. Because teachers are expected to empower the students with such

skills, teacher preparation programs should offer multiple opportunities for teacher candidates to learn, develop and practice these skills, named 21st Century Skills.

2. Paper Theoretical Foundation and Related Literature

International research, education planners, organizations interested in the education field - all contributed to the development of the concept “21st Century Skills” and of the frameworks needed for students to be successful in an information-based, technology driven, global society. For example, the Partnership for 21st Century Skills (2010), which is an organization established in 2002 by leaders in business and education, all advocating to assure a 21st century education for all learners, defined 21st century students outcomes as the blending of core subject areas (traditional subjects taught in schools) and 21st century interdisciplinary themes (global awareness, civic literacy, health literacy, financial, economic, business and entrepreneurial literacy, civic, health, environmental literacy) with specific skills, expertise, and literacy skills necessary for future success. Skill categories include: learning and innovation; information, media and technology; life and career. Learning and innovation skills are comprised of the 4 Cs of critical thinking, communication, collaboration, and creativity. Information, media, and technology include literacy skills within each component (access and evaluate information, use information accurately and creative, analyze media, create media product, apply technology effectively). Life and career skills involve developing the ability to adapt to change, to be flexible, self-directed, to manage goals and time, to work independently, to interact effectively with others, to be a leader and to act responsibly (Partnership for 21st Century Skills, 2010, Appendix B).

In Europe, the 21st century skills have mainly been defined according to the European Reference Framework of Key Competences, which was defined in the Recommendation on key competences for lifelong learning (European Parliament, Council of the European Union, 2006, Annex). The Recommendation defines 8 key competences needed by all individuals for personal fulfillment and development, active citizenship, social inclusion and employment: communication in the mother tongue; communication in foreign languages; mathematical competence and basic competences in science and technology; digital competence; learning to learn; social and civic competences; sense of initiative and entrepreneurship; and cultural awareness and expression (European Parliament, Council of the European Union, 2006, Annex). In Romania these competences “determine the student's training profile for primary and secondary education” (National Education Law, 2011, article 68, p.11). These key competences are not finite and their development “should be supported by transversal capabilities and skills such as critical thinking, creativity, sense of initiative, problem solving, risk assessment, decision-making and constructive management of feelings” (Gordon et al., 2009, p.26).

Since teachers must be able to guide pupils towards skills needed in future society, the 21st century skills, then teacher preparation programs should consider this issue, at different levels: standards, curriculum, instruction and assessment. Teachers themselves need to acquire competencies to teach 21st Century Skills to their students, to purposefully integrate these skills into the core curriculum.

From the perspective of initial teacher training, preparing students with these skills requires creating learning practices and supports for prospective teachers, who have to learn new pedagogies with curriculum and instruction that promote 21st century skills. In a study about the ways the adult pre-

service teachers apply 21st century skills in the practice, is considered that “is extremely important that graduating teachers have such professional abilities as to implement 21st CS in their work skillfully and with courage” (Valli, Perkkilä, & Valli, 2014, p. 122).

Considering that this research study is focused on fostering the skills from the Learning and Innovation category, we are going to present them as they are defined in the Partnership for 21st Century Skills (2009, p. 3-4):

- Collaboration skills involve the ability to work effectively and respectfully within a team, the willingness to compromise to accomplish a goal, and assume shared responsibility.
- Communication skills entail being able to articulate ideas and thoughts effectively through oral, written, and nonverbal methods, possess the ability to decipher meaning through listening, using communication for a range of purposes and being able to converse in diverse environments.
- Creativity skills refer to using a wide range of idea creation techniques, such as brainstorming, creating new and worthwhile ideas, being able to analyze and evaluate original ideas and working creatively with others.
- Critical-thinking skills are about using various forms of reason, such as inductive and deductive, analyzing how parts of a whole interact with each other, evaluating major points of view, and reflecting critically on learning experiences and processes.

Learning and innovation skills “are being recognized as those that separate students who are prepared for the more and more complex life and work environment of the 21st century, and those who are not” (The Partnership for 21st Century Skills, 2009, p.3). We mention that all four skills are also found in the competencies profile of the European citizen for the 21st century.

3. Methodology

The subjects of this research study included 22 students (all female) enrolled in a three years undergraduate study program for training pre-primary and primary school teachers, named Pedagogy of Primary and Preschool Education, at Lucian Blaga University of Sibiu, during the first semester of the 2015-2016 academic year. These students attended the discipline of Theory and Methodology of Instruction (TMI), which is part of the teacher training curriculum for pre-primary and primary school teachers, with 2 hours of course activities and 2 hours of seminar per week. The aim of this course is to help students to acquire skills in the design, implementation and evaluation of training at preschool and primary education levels. Our intentions related to this study were to provide the 2nd year students with opportunities to acquire knowledge and practice of the 21st Century Skills within this discipline and to prepare the transfer of teaching these skills on pre-primary and primary curriculum, considering the perspective that these students are going to be future educators, who are expected to be able to facilitate the acquisition of 21st century skills for their future pupils. The 21st Century Skills that were chosen as the focus of this study were: communication, critical thinking, collaboration and creativity (the “Four Cs”), which form the framework for classification. We would like to mention that these four skills are compatible with the professional and transversal profile of competences for the graduate of this Bachelor study program.

The goal of our investigation was to prepare the teaching candidates in order to own, teach and assess the “Four Cs” in relation with the curriculum they will teach as pre-school and primary future teachers. For this, we designed a two phases instructional model within the discipline. During the first phase, the students had been exposed to a wide range of teaching and learning strategies during the courses and seminars activities throughout the semester, including those that helped them become familiar with the concept of 21st Century Skills. The students were explicitly taught how to perform the “Four Cs”. Then, the students practiced these skills (communication, critical thinking, collaboration and creativity) directly related to the discipline associated content. This phase was envisioned as a background for developing a peer teaching process, from the perspective of these skills.

Convinced by the idea that having more practice before graduating has a crucial role in the improvement of the practitioners’ professional skills, we provided an instructional environment for the “Four Cs” teaching practice within the 2 hour seminars, starting with the 7th week of the semester (phase 2). This experience of micro-teaching practice was seen as a preparation for the prospective teachers’ authentic practice in kindergartens and schools. Considering the three dimensions of instructional design - planning, instructing and assessing (Skowron, 2006), the prospective students were given support for going through the following stages:

- Planning to teach at least one of the “Four Cs” skills – future teachers decided about the content (extracted from the curriculum for preschool and primary school education) and skills to be taught, the methods that will be used, and the assessment evidence that will be gathered. The students were offered the opportunity to choose how to approach the task: individual or in groups (up to three members).
- Micro-teaching at least one of the “Four Cs” skills – prospective teachers used specific methods to teach content during the assigned time (20-30 minutes).
- Assessing at least one of the “Four Cs” skills - using measures to determine whether the student has achieved the established instructional outcomes.

The micro-teaching session was part of course examination, in addition to the written test and students’ portfolios. The students had to conduct documentation work regarding the curriculum for preschool and primary education, in terms of the four skills. They are treated as goals (for preschool) and skills (for primary education), within experiential or curricular domains and contents. Students were given the opportunity to choose the level (pre-school or primary), field / area, discipline, subject, type of work, skill / s (one or more) to support the activities of micro-teaching, work form (individually or in groups).

Thirteen sessions of micro-teaching took place: six individual sessions, five - in pairs and two in groups of three. 62% of these micro-teaching sessions were focused on applying the “Four Cs” on themes extracted from the curriculum for primary school (the disciplines that were covered: Romanian literature and language, Mathematics, Natural Science, Personal Development, Visual arts and practical skills) and 38% were focused on pre-school curriculum (with the following domains covered: Language and Communication, Aesthetic and creative, People and society, Sciences). The students’ choices covered all four desired skills. Even more, over 50% of the micro-teaching sessions were focused on more than one of the “Four Cs”.

Because the ability to teach in order to master content - while also developing 21st century skills among students- proves to be a challenging task for most teacher candidates, they were given support and

feed-back in the planning work. At the end of each 21st century skills micro-teaching episode, time has been allotted for reflection on content, skills and teaching process (completed by the peer who participated to that session, by the instructor, the member of the teaching team). Through this model we intended to provide the students with the opportunity to develop experiential knowledge of 21st Century Skills - learning and teaching in a controlled way and getting feed-back after the micro-teaching activity, in order to encourage reflection.

Through a qualitative design, the study explored teacher candidates' experiences from the Theory and Methodology of Instruction course. The following questions guided the investigation:

- To what extent do students believe that they have developed the desired “Four Cs” skills and the ability to integrate these skills into pre-school and primary school curriculum?
- What aspects of the course influence students' perception on development of the “Four Cs” skills?
- What strategies do students deliberately use/intend to use to promote the “Four Cs”?
- How did the students perceive their teaching and learning activity related to 21st century skills, in terms of benefits and difficulties?

At the end of the semester an anonymous survey questionnaire was administered in order to obtain students' perceptions of various aspects of their teaching and learning activity related to the “Four Cs”. The questionnaire contained closed and open-ended questions, which supplied data for analysis. The questions in the questionnaire were designed around the research questions. Students' open-ended responses were used to understand the students' perspective of 21st Century Skills. A coding process was utilized in attempts to gain meaning from the data collected during the research study.

4. Results

In this section, the findings from the analysis of the student questionnaire are going to be reported. The first aspect of interest was the students' perceptions on the “Four Cs”. Students were asked to rate the extent up to which they developed the “Four Cs” within the course experience on a 5-point Likert- type scale (1 = in a very small extent; 5 = In a very large extent). Each skill was considered from a double perspective: the students' own learning process of that skill (possessing) and the students' ability to integrate (teach and assess) that skills into pre-school and primary school curriculum, as a result of being enrolled in the course. The ratings are shown graphically in Table 1.

Table 1. Students' perceptions on the “Four Cs” skills

The students' own learning process of these skills (possessing)	Mean	The students' ability to teach and assess these skills	Mean
Communication	4.5	Communication	4.2
Critical thinking	4.2	Critical thinking	3.9
Collaboration	4.3	Collaboration	4.1
Creativity	4.1	Creativity	3.8

The students rated each of “Four Cs” on a 5-point Likert-type scale, for both desired dimensions. The findings support the idea that instructional practices implemented during the TMI course determined the students' positive perceptions on the opportunities to develop these four skills. The results, however,

show lower values for the component related to teaching and assessment of these skills for pupils, compared to the size of the development of these skills (which received values of more than 4 on the Likert scale). The students were faced with the reality that the transfer of these skills in a pedagogical activity requires multiple and complex aspects such as: formulation of objectives, organization of content and a good choice of training strategies, selection of the evaluation methods, classroom and time management etc. and that more practice is necessary for developing these skills.

The next research questions aimed to identify what aspects of the course influenced the students' perception on "Four Cs", considering the same double perspective. Thus, for each skill (communication, critical thinking, collaboration and creativity) two open-ended questions were formulated. The first one targeted students' perception on the opportunities they had to develop that skill for themselves as a result of being enrolled in the course, and the second focused on the students' perception of the opportunities they had to teach and assess that skill. For both questions concerning each skill, students provided more than one answer and the responses were grouped and categorized, as connecting themes emerged.

The most reported aspects of the course that helped students to possess the "Four Cs" skills are presented in Table 2.

Table 2. Students' perceptions on aspects of the course that helped with development of the "Four Cs".

Communication	Frequency of mention (f)	Critical thinking	Frequency of mention (f)
Interactions with teacher and colleagues	14	Application of critical thinking methods in relation with course content	15
Freedom to express ideas	11	Focus on understanding and interpreting knowledge	11
Debates	8	Using previous learning experiences and knowledge	9
Asking questions	8	Reading and writing activities	8
Group work	7	Reflection	6
Power Point presentation	6	Questions and answers sessions	5
Writing activities	6	Multiple perspective approach	3
Preparing course portfolio	5	Problem solving	3
Warm-up activities	4		
Collaboration	Frequency of mention	Creativity	Frequency of mention
Group work activities	18	Application of creativity methods	12
Sharing ideas	11	Positive climate	11
Peer support	5	Freedom to express ideas	9
		Constructive feed-back	6
		Multiple perspective approach	5

With respect to opportunities for development of ability to integrate (teach and assess) the "Four Cs", the students' responses were quite similar for each skills. That is why we presented them together. The aspects most frequently mentioned by the students were: micro-teaching sessions - planning and delivering (f=17), taking part into micro-teaching sessions sustained by peers (f=14), feed-back from

teacher (f=13), feed-back from peers (f=11), self-reflection (f=8), learning by doing (f=8), learning from others' actions (f=7) mistakes (f=3).

The third research question sought to understand students' perspectives on the relationship between the development of "Four Cs" and the instructional methods they used or they would use in their teaching activities. Table 3 presents the students' multiple responses to the question: What strategies do you deliberately use/intend to use to promote the "Four Cs" skills?

Table 3. The "Four Cs" and Instructional Strategies

Communication	Frequency	Critical thinking	Frequency
Questions and answers*	14	Inquiry	11
Think-Pair- Share*	12	Questioning*	9
Games*	11	KWL – Know, Want, Learn*	7
One minute paper**	9	Problem solving	6
Discussion*	8	Debates*	5
Dual-entry diary*	8	Cube method*	4
Debates*	7	Case method	4
Using visuals *	6	Making predictions*	3
Ice-breaking*	5	Reflection*	3
Fishbowl	4		
Role play *	3		
Personal Response Cards	2		
Short in-class writings	2		
Student presentations	1		
Collaboration	Frequency	Creativity	Frequency
Jigsaw*	15	Brainstorming*	14
Think-Pair- Share *	12	Six thinking hats*	12
Gallery tour*	10	Drawing, posters*	11
Reciprocal teaching*	6	Brain-writing*	7
Value line	5	Free write	6
Phillips 6-6*	4	Quintet*	5
		Project	4

*Instructional strategy already used by students in the micro-teaching sessions

Students' answers made reference to a wide range of instructional strategies that can be used for the development of the "Four Cs", including those that have been applied in the work during the seminar and their sessions of micro-teaching but also other strategies whose potential is worth exploring.

In the final part of the questionnaire, the participants were asked to list their own benefits and the difficulties met in their teaching and learning activities related to 21st Century Skills. The benefits and difficulties were coded into categories (see Table 4) and the results were listed according to frequency of occurrence. Participants perceived the course as a worthwhile experience and its components as beneficial in their development as teachers. Overall, positive students' comments revealed that many students enjoyed the course experience. Here are some students' comments:

“This course gave us an excellent opportunity to practice the skills that first of all we need, as future educators, in order to initiate the children with whom we work. The fact that we practiced here first gave me confidence that I can do this in class too. Feed-back from the teacher and from classmates helped

me realize my strengths, but also aspects that need improvement, such as: timing and monitoring class work." (Pre-service teacher 6)

"Great experience! I learned from what we did, what we discussed and what I've seen, from mistakes, but also from the examples of good practices. I taught along with two other colleagues. We have designed together, we divided the tasks and emotions and I was happy with what we managed to do." (Pre-service teacher 11)

"I never thought that for such a short task (20 min) I have to work so much. All the preparation work - to choose what I want to do, make a plan, to formulate goals, choosing methods to evaluate it-took me much longer than I thought. It was the first sketch plan that I made and my first experience as a teacher. I chose to work on the skill of collaboration, applying the Jigsaw method and I succeeded with my peers' support. After the activity discussions were very helpful. I feel like I have a lot to learn, but I am on the right path." (Pre-service teacher 14)

Although student-teachers did not mention motivation as a benefit, it was easily to observe that manifesting in their creativity and efforts regarding the activities preparation. The chance to teach and to act like a teacher, before becoming ones, was challenging for the students, but not overwhelming.

Table 4. Students' perception on the benefits and difficulties related to 21st century skills experience

Benefits	Frequency	Difficulties	Frequency
Knowledge of the 21st Century Skills concepts	12	A lot of time required for preparation of the micro-teaching sessions	9
Practicing the "Four Cs"	11		
Gaining experience in planning a learning activity	9	Poor group management skills	6
Teaching the "Four Cs"	9	Limitation of the assigned time	5
Connecting theory with practice	8	Anxiety to teach	3
Using teaching tools (including technology)	6		
Research on curriculum	6		
Applying assessment methods or instruments	5		
Gaining confidence in teaching skills	5		
Practicing reflection	4		
Collaboration	3		

The difficulties the students encountered during the whole process are natural for the stage they are in and can be overcome in the course of time as prospective teachers gain more experience (for instance: anxiety to teach or group management skills). Besides these, we also observed that some of the prospective teachers' tended to stand in front of the classroom and not move around the classroom during class teaching; some students had too much visual contact with instructional materials in detriment of class eye contact, others paid more attention to the content than to the needs of the class. All these issues were discussed during the reflection stage, offering constructive feedback to students.

5. Discussions

All students enrolled in the Theory and Methodology of Instruction course were offered the opportunity to discover instructional strategies adequate for teaching at pre-school and primary school levels and to connect these strategies with 21st Century Skills. Students gained experience in four skills:

communication, critical thinking, collaboration and creativity in terms of learning, practicing, teaching and assessing them. For some students adopting the “Four Cs” was easier than for others, especially for those with some experience in working as a teacher, but all the students proved dedication during the formal activities.

Throughout the entire semester the goal was to create an instructional context in which these skills to be known, practiced and integrated into the course associated curriculum; after that, the students tried to realize the transfer of these skills to the pre-school and primary school curriculum. Thus students have experienced training situations associated with each skill, and then, they designed and created such learning situations themselves. We considered that the environment provided by interaction with peers is a more suitable and less stressful one for students, in terms of teaching these skills. The approach we developed offered students the opportunity to practice the teaching design process, to formulate concrete education objectives and to track their realization by choosing appropriate content and methods, to practice assessment from the teacher's perspective.

The option to let the students choose a theme, a skill, the practice methods, approach (individual or team) had a motivational effect for them. The students had the chance to put into practice the instructional methods covered within the course's curriculum. During the micro-teaching sessions, many instructional methods were applied by the students themselves, such as: role play, six thinking hats, brainstorming, gallery tour, jigsaw, Think/Pair/Share, reciprocal teaching, games, predictions and so on. They also used traditional and modern teaching aids, such as: blackboard, chalk, text books, charts, pictures, posters, maps, atlases, worksheets, models, crossword puzzles, toys, costumes, computers, Power Point presentations, overhead projector, DVD players, educational CDs and DVDs and so on in order to help in effective teaching, to make the micro-teaching activities more interesting and realistic and to make the learning process more solid and durable.

From the perspective of the evaluation process that they had to make during their activity, the students chose formative methods and tools, such as: observation, rubrics, five minutes essay, questions and answers, drawings and so on. Teacher candidates received assessment feedback in order to reflect on and to refine their own teaching activity. As new micro-teaching activities were planned and implemented, the students reflected on the process and learned from each others experiences.

6. Conclusions

Within the provided student-centered instructional context, the prospective teachers had the opportunity to begin practice for teaching the 21st Century Skills in an initial course on Theory and Methodology of Instruction. They had the chance to develop, practice, teach and assess four skills: communication, critical thinking, collaboration and creativity learning, which are part of the so-called 21st century skills. This was a preparatory experience for the real pedagogical practice in schools, where prospective teachers could continue implementing what they started doing during this course.

The students acquired knowledge of the 21st Century Skills concepts and practiced the integration of the “Four Cs” into the curriculum for pre-school and primary school education with their peers, as an exercise for their professional future. They are the teachers of 21st century who are expected to have expertise in teaching the 21st century skills to their students. The knowledge, the skills developed during

teacher education are crucial for how students will behave as future teachers, for how they will encourage 21st century skills. We are aware that the ability to bring the “4 C’s” to life and to guide pupils into developing these skills requires a lot of pedagogical practice, reflection and continuing professional development. By our approach these teacher candidates made a small step on a long and challenging way to the future. Even though this study has its limitations as a result of the small sample population of 22 students, we hope that the findings may inspire other university teachers involved with teacher education programs to ensure appropriate knowledge and experience related to the 21st century skills for pre-service teachers. They need this for themselves and for their future children and pupils.

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