# 21st Century skills in the Ecuadorian school context: Students' critical thinking, problem-solving and decision making

## Destrezas del siglo 21 en el contexto escolar ecuatoriano: Pensamiento crítico, resolución de problemas y toma de decisiones

## Habilidades do século 21 no contexto escolar equatoriano: pensamento crítico, solução de problemas e tomada de decisão

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## Abstract

This work aims to improve the critical thinking, problem-solving, and decision-making in elementary education students in Ecuador. It used a mixture of qualitative and quantitative research approaches to collect information to analyzes the participants' perceptions and knowledge concerning 21-century skills. They were sixty-four participants, including 59 students and five teachers from two educational institutions in Manta, Ecuador. They were organized in experimental and control groups to participate in an educational intervention to strengthen students' skills during 2020. It administrated an adaptation of the 21CLD learning activity rubric proposed by Stehle and Peters-Burton (2019). The research instruments were focus groups, Likert questionnaires, and class observation. The results show that teachers and students are aware of the application of 21st-century skills in the school context. Furthermore, It found significant differences between the critical thinking, problem-solving and decision making skills pretest and post-test in the experimental group and control group. Thus, it concluded that the skills of 21st-century citizenship could be strengthened in the school context using appropriate pedagogical activities since English as a foreign language class.

***Keywords:*** Communication skills, creativity, critical thinking, learning process, analytical skills.

## Resumen

Este trabajo tiene como objetivo mejorar las habilidades de pensamiento crítico, resolución de problemas y toma de decisiones en estudiantes de educación primaria en Ecuador. Utilizó una combinación de enfoques de investigación cualitativos y cuantitativos para recopilar información para analizar las percepciones y el conocimiento de los participantes sobre las habilidades del siglo XXI. Fueron sesenta y cuatro participantes, incluidos 59 estudiantes y cinco profesores de dos instituciones educativas en Manta, Ecuador. Se organizaron en grupos experimentales y de control para participar en una intervención educativa para fortalecer las habilidades de los estudiantes durante 2020. Se administró una adaptación de la rúbrica de actividad de aprendizaje 21CLD propuesta por Stehle y Peters-Burton (2019). Los instrumentos de investigación fueron grupos focales, cuestionarios Likert y observación de clases. Los resultados muestran que docentes y estudiantes son

conscientes de la aplicación de las habilidades del siglo XXI en el contexto escolar. Además, se encontraron diferencias significativas entre el pretest y el postest de las destrezas pensamiento crítico, resolución de problemas y toma de decisiones entre el grupo experimental y el grupo control. Se concluye que las habilidades de la ciudadanía del siglo XXI podrían fortalecerse en el contexto escolar utilizando actividades pedagógicas adecuadas desde la clase de inglés como lengua extranjera.

*Palabras clave:* Habilidades comunicativas, creatividad, pensamiento crítico, proceso de aprendizaje, habilidades analíticas.

## Resumo

Este trabalho visa aprimorar o pensamento crítico, a resolução de problemas e as habilidades de tomada de decisão em alunos do ensino fundamental no Equador. Ele usou uma combinação de abordagens de pesquisa qualitativa e quantitativa para reunir informações para analisar as percepções dos participantes e o conhecimento das habilidades do século XXI. Havia 64 participantes, incluindo 59 alunos e cinco professores de duas instituições de ensino em Manta, Equador. Eles foram organizados em grupos experimentais e de controle para participar de uma intervenção educacional para fortalecer as habilidades dos alunos durante 2020. Uma adaptação da rubrica de atividade de aprendizagem 21CLD proposta por Stehle e Peters-Burton (2019) foi administrada. Os instrumentos de pesquisa foram grupos focais, questionários Likert e observação de aulas. Os resultados mostram que professores e alunos estão cientes da aplicação das competências do século XXI no contexto escolar. Além disso, foram encontradas diferenças significativas entre o pré-teste e o pós-teste de pensamento crítico, resolução de problemas e habilidades de tomada de decisão entre o grupo experimental e o grupo de controle. Conclui-se que as competências da cidadania do século XXI podem ser fortalecidas no contexto escolar por meio de atividades pedagógicas adequadas a partir da aula de inglês como língua estrangeira.

*Palavras-chave:* Capacidade de comunicação, criatividade, pensamento crítico, processo de aprendizagem, capacidade analítica.

## Introducción

The latín American students' learning way has not varied enough in recent years despite the changes in the global education content and 21-century skills that students must acquire. Thus, in a competitive educational environment, students will not be able to demonstrate their maximum potentialities. Probably, the student will continue with the same content pattern for all their years of education without developing the competencies where communication, reasoning, and interaction are essential for successful live performance.

The observation of the primary education practice in the región allows ratifying that education does not prepare enough the students to live and work in an information-age society. As a result, employers challenge entry-level workers who lack the practical skills required to create, build, and sustain an information-rich business (ATC21st, 2011a). New forms of living in the world come up, and with that, new socialization, education, and work ways. It is challenging to learn how to learn these days since interaction have changed a lot, especially in the 21st-century being the technology age where the learners search for knowledge actively and independently (Blaschke & Hase, 2016). They are encouraged to find the content and analyze it by themselves to gain meaningful learning.

This research focuses on three aspects of thinking: critical thinking, problem-solving, and decision making, in Ecuador, during 2019-2020. The research team's motivation behind this work is helping the student develop the 21st-Century skills, expecting to ensure more inclusive and equitable education and to promote lifelong learning opportunities for all in coherence to UNESCO (2017). Thus, according to the Ecuadorian Development Plan "Toda una vida" (2017-2021), it is possible to contribute by Strengthen the system of social inclusion and equity, integral protection, and the system of care during the life cycle of people, with emphasis on priority care groups, considering territorial contexts and socio-cultural diversity (Macías-Mosquera & Villafuerte-Holguín 2020). Thus, the questions to answer in this research are:

1. What are the teachers' perceptions about 21st-century skills?

2. What are the students' levels of knowledge and use of 21-century skills?

3. What are the changes reported in the students' critical thinking?

This work aims to improve elementary students' critical thinking, problem-solving, and decision-making skills.

## Education for the 21ST-Century Skills

The 21st-century skills include collaboration, communication, digital literacy, citizenship, problem-solving, critical thinking, creativity, and productivity (Voogt & Roblin, 2012). According to Kivunja (2014), they are the skills requires for young people to succeed as individuals, citizens, and workers in the 21st century for numeracy and literacy (*e.g., the 3Rs of reading, -riting, and –rithmetic)*. However, an educated person must also have skills for resolving problems with efficiency. Nevertheless, the skills are the abilities and knowledge required to face the today challenges (Alismail & McGuire, 2015).

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According to Rivera (2016), 21st-century skills prepare students for jobs that still do not exist, where they will be using technologies that not been discovered yet, to solve problems that still are unknown.

Thus, the the Assessment and Teaching Project of 21st-Century Skills (ATC21s) emerged. It is an initiative that Microsoft, Intel and Cisco, and the University of Melbourne promoted and supported from 2009 to demostrate to governments around the world, how technology is changing today's formation of students and working areas. It began with the 'White Papers' which is the compilation of information concerning 21st-century skills, the methodological issues that imply, the technological issues, the classroom learning environments, and formative, evaluation, and policy frameworks for new assessments. Costa Rica is the only Latin American country participating among countries that joined the initiative are U.S.A, Australia, Finland, Netherlands, and Singapore.

These skills are labeled '21st-century skills' to indicate that they are more related to the current economic and social developments than those of the past century characterized as an industrial mode of production (Van Laar, Van Deursen, Van Dijk, & De Haan, 2017).

However, in the era of information, technology takes a more significant role in today's education, helping students develop competencies that imply efficient communication, analysis, and problem-solving, among others (Care, Kim, Vista, & Anderson, 2018). Thus, skills related to technological alphabetization, information visualization, and communication are the most discussed. In the same way, teamwork, self-management, and critical thinking also are regular for 21st-century skills (Gómez-Parra & Huertas-Abril, 2019).

In such a scenario, education is a fundamental pillar on the construction of society through the promotion of skills as computational thinking, considering critical how to break down a problem, process data, create procedures, and generalize them (Valencia & Panaqué, 2019). Thus, Rivadeneira (2020) argues, critical thinking is closely related to three types of

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meta-knowing: metacognitive, meta strategic, and epistemological. At this point, people must think about what is known and how to confirm it. It would help if teachers also used metrics to check learners' knowledge with the best problem-solving tools.

## Ways of thinking

According to the ATC21st project (2011b), to achieve the project goals, it divided the skills into four categories: ways of thinking, working methods, ways of working, ways of living in the world. The ways of thinking classification include creativity and innovation, critical thinking and problem-solving, decision making, learning to learn, metacognition.

Critical thinking and problem-solving skills include reasoning effectively, using systems thinking, making sound judgments and decisions, and solving problems (Germaine, Richards, Koeller, & Schubert-Irastorza, 2016). It is a priority to discuss this part of the project because it is a relevant point that students must develop for the future.

To McPeck (2016), critical thinking requires the judicious use of skepticism, tempered by experience, such that it is productive of a more satisfactory solution to, or insight into, the problem at hand. At least, It is not just teaching how to think or what to think. It is about developing strategies to see more of what is visible, expand the mind, and develop the student's thinking process.

Decisions define our future. They often come in a series of connected decisions and encourage us to think about what will come next. Decision-making skills across all disciplines and are transferrable to any job, career, or vocation.

Decision-making is also a part of thinking because of its great importance for students developing for future situations requiring essential decisions. Another skill that comes with the ways of thinking is learning to learn, and for Quinn (2018), it is about seeking actively and being in constant look

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for continuous feeding of tangential thoughts and how to evaluate it for helping students to understand something new.

## Integration and inclusive education

An education concerned with giving an educational response attentive to each student's differences presents and achieves good academic and professional results for all (Booth, Simón, Sandoval, Echeita, & Muñoz, 2015)

Over time, it became clear that "integration" making a place in an existing system for previously excluded people was not enough. "Integration" tended to retain the notion that there were two kinds of people: "regular" or "normal" people and those who were "integrated." Schools and other programs thinking "integration" also tended to retain old ways of doing things, and many of these did not work well with the more diverse population. It taught that a new way of thinking and acting was needed (Hughes & Acedo, 2016).

Inclusion as a value and way of thinking requires something more. Inclusion is about people gaining "social acceptance," having positive interactions with one's peers and being valued and accepted for who they are. As such, it must be "internally motivated" and stem from embracing the belief that all people have value and the right to belong (UNESCO-ORE-ALC, 2017).

Social skills and the ability to interact well in a given situation also play an essential role in developing young students. Students in the classroom work together to accept and negotiate different perspectives, learn more about reciprocity by becoming socially competent children, and improve social interactions as adolescents and adults who function appropriately in diverse family, educational, and social contexts (Rodríguez, Villafuerte-Holguín, Quijije, & Zambrano, 2021). Thus, inclusion values diversity allows for the real opportunity for people (both with and without disabilities) to have meaningful relationships. However, in the Ecuadorian context, even with the advance of the government policies for improving

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inclusive education, the studies show the necessity to work on their implementation to guaranty the inclusive right of people (Bravo, Bernarás, Garaigordobil, & Villafuerte-Holguín, 2021).

Among the preliminary works of this research appears Portillo-Torres (2017), He determined that a relevant change arises concerning the students' conceptual, procedural, and attitudinal areas in the fragmented vision of education. Thus, the ability of collaborative problem-solving demands psychosocial skills. Then, children, adolescents, and young people learn to negotiate and communicate with similar groups. However, this process turns out to be a highly complex dynamic at the time of being evaluated. For its part, the work of Sierra-Villamil (2018) shows that the activities of the 21st-century teacher consist of creating environments that facilitate autonomous learning. The work of Peters-Burton, House, Han, & Lynch (2018) determined the requirement of information about teachers perceptions concerning to (a) training needs on $21^{st}$ Century skills, (b) more frequente students' skills practice and scaffolding (c) students' more time for long-term projects requirement. Thus, communication offers innovative and collaborative supports that turn out to be key in the training process. The study by Stehle and Peters-Burton (2019) showed that although communication and collaboration skills facilitate the construction of knowledge and the resolution of real-world problems, these skills are not easy to teach.

## Methodology

This work subscribes to the critique of paradigms. It used qualitative and quantitative approaches to educational research. Among the specific objectives of this study are: (a) to determine the teachers' perception of the skills of the 21st century, (b) to design didactics to strengthen the skills of the 21st century in the context of primary education in Ecuador, and (c) determine changes in the use of skills in students' critical thinking, problem-solving and decision making.

## Participants

Sixty-four people integrate the group of participants among students (59) and teachers (5). They attended public and private schools in canton Manta, Ecuador. They integrated the experimental and the control groups. (Table 1).

Table 1. The participants

| Schools | Students | Teachers | Total | % |
|---|---|---|---|---|
| Public school (experimental group) | 30 | 2 | 32 | 50.85 |
| Private school (control group) | 29 | 3 | 32 | 49.15 |
| Total | 59 | 5 | 64 | 100.00 |

**Source:** project registers (2019-2020).

## Instruments: The instruments used in this research are the following

**Focus group. -**The instrument's purpose was to collect teachers' perceptions about 21st-century skills. The instrument was proposed ad. hoc by the researcher team and tested by a specialist panel integrated for professionals of Education management, Didactics, and Educational Psychology. They were affiliated to a public university located in Ecuador. The original instrument version had eight questions. The version used in this research had four questions related to 21st-century skills instruction. After the implementation of the panel recommendations, the researche team administrated the instrument using a teleconference application.

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**Lickert questionnaire. -** The instrument was designed ad. hoc by the researcher team to collect information from the students about 21st-century skill instruction in the school context. An expert panel, integrated for three educational researchers affiliated with an Ecuadorian public University,

tested the instrument. The original instrument version included 15 questions, but after the experts' panel's corrections, the final version consisted of 8 questions with five possible answers from 'Total disagree' to 'Total agree' after the final corrections to the instrument, it used a Google form to collect the participants' answers.

**The 21CLD learning activity rubric**. - The instrument is an adaptation of the 21CLD learning activity rubric proposed by Stehle and Peters-Burton (2019), which considered the categories (1) Knowledge construction, (2) Real-world Problem Solving, (3) Skilled communication, (4) Collaboration, (5) Use of ICT, and (6) Self-regulation. The instrument used was centred on the participants' critical thinking and interaction skills before a group of complex imagination situations. The participants have limited time to analyze a given situation and to write a posible solution on a paper sheet. After, they explain the solution orally. The research team used the instrument in the pretest and posttest.

**Analysis of data.** - The study carried out a categorical analysis of the information collected through the interviews concerning to the teachers' perceptions regarding 21st-century skills. It followed the recommendations of Kuhlthau, Maniotes, & Caspari (2015), and it used the Nvivo software. For the statistical analysis of the data collected through a Likert-type questionnaire and the monitoring of the students' metacognitive processes of the experimental and control groups in pretest and post-test. The data was analyzed using the SPSS v24. The hipothesys tests used T student index having a *p-value*=0,050.

## Results

The results are exposed following the order of the research questions presented in the introduction part.

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**Question 1: What are the teachers 'perceptions about the 21st century skills?** The teachers' perceptions were organized and analyzed following the categories (a) 21st century skills to encourage students' collaboration and communication, (b) 21st century skills to promote students' Social and environmental awareness, (c) 21st century skills to strengthen students' Critical thinking, and (d) 21st century skills to strengthen students' sense of responsibility. (Table 2).**Table 2.** Benefits and usage of 21st century skills on students.

Table 2. Benefits and usage of 21st century skills on students.

| Voices of the participants | Subcategories |
|---|---|
| **Category a: 21st century skills to encourage students' collaboration and communication** | |
| A: "Developing social dramas by recording each of the scenes and then editing them for a final presentation. Interaction with students from other countries to strengthen the language through video conferences." | Communication and collaboration. |
| B. For me, the first one is conversations, where you interact with each other, in the classroom I like my students to participate, to be the center of the class, because when you are working, you are the center of that, so you ask your students to not only act but to react, it´s a good achievement, performance or activity to do." | Promotion of social interaction. |
| C: "Now with the virtual thing I really encourage and propose to have more intercultural communication with other schools, with other programs and other countries and we can have zoom to make the conferences for all the talking and develop their communication skills, I think that will be the best, if we create commitments with other institutions or other parts of governments or other countries." | Promotion of intercultural communication. |
| D: "Obviously group presentation but not only in power point, for example it can be a role play activity. So, students can talk to each other, they organize themselves, prepare themselves to present like a situation in which they are acting. Also, it would be debates which is interesting cause students have a part that agrees and disagrees. Teachers can teach students how to politely disagree which involves social skills and 21st century skills, because is not only about who is right, but also, how you convince the other part about your stands whether you disagree or agree with a topic and without hurting anyone else's feelings. Not being over emotional and it would be fair. Actually, a function part and how they belong in their school community, there they can work with each other, organize themselves within the groups, but also with the whole and class and school which evolves all the educational community" | Interaction in the execution of school projects<br><br><br><br>Sence of community |

| Category b: 21st century skills to promote students' Social and environmental awareness | |
| --- | --- |
| A: "With real life situations, showing what is happening in the world and the damage they cause." | Metacognition. |
| B: "In that case, I motivate my students to socialize with other people, because wanted or not, at the end of our lives we are socializing, interacting. I encourage students to discuss to interact, just to be social." | Interaction and motivation to the participation. |
| C: "The 21 century brough us this environmental issue like the global warming and the whole thing so I really recommend having projects with students that involves being out or ether planning a trip or cultivated your own food projects, things like that will encourage them to motivate them and help the environment." | |
| D: "This happens more through imitation. I think is kind of hard to teach, because is up to the students to act in a way or not. It also depends on their personality, what they are going through, their social and emotional development. Most significantly I think the student can be more social, polite through imitation so I guess is really important for the school staff to be well trained and to be a model for the students so they can see that and be an example for them." | Metacognition.<br><br>motivation to the participation. |

| Category c: 21st century skills to strengthen students' Critical thinking | |
| --- | --- |
| A: "By analyzing the situations presented and debating their own proposals based on real facts." | Critical thinking |
| B: "Is needed for every single stage for example if your 18, 17 people don't care about it  but on the time you're getting older you need to read all paper, all contract every single page that u need to read to get to know what is it about, so I use techniques with my students like multiple choices or reading for skimming or scanning or for comprehension because at the end of the reading the students will have an extra point. So, I develop critical thinking to answer any question or any request from the other side." | Critical thinking |
| C: "If we are talking about discuss in general critical thinking is not being reinforce yet, cause our teachers are not really prepare for that so we are just in the way to do it." | |
| D: "Critical thinking can be reinforced with the use of technological resources, for example you can have students play videogames, it depends on the videogame but some of them have main mission and sub missions that can have problem solving in creative ways and analyzing different situations and what solutions is better for that and if it's something that needs to be reinforced, you as a teacher should use activities that students are actually excited to do instead of normal textbook task." | Critical thinking<br><br>Critical thinking |

| Category (d): 21st century skills to strengthen students' sense of responsibility | |
|---|---|
| A: "On this subject the students of this century do not show much responsibility in some learning subjects, as they are much more passionate about what they like to do." | |
| B: "I don't know if they achieved it or not, but this is a basic principle of human being, some people are very responsible but not all, and how encourage them to be responsible for every single activity they have to do. teach them to achieved not only responsibility for example be punctual at class but I'm teaching more than responsibility I'm teaching ethic because we as human being have to be like that." | Social and personal responsibility.<br><br>Motivation for participation. |
| C: "They have a lot of responsibilities because now in the ages that we are living, the world we are living we have a lot of issues with the environment, education and in the different areas so they are the ones who are going to bring the solution to this so their responsibility is huge because they need to find most of the solutions to most of the problems that we might face in the future." | Metacognition.<br><br>assumption of personal responsibility. |
| D: "As I mentioned before it has to deal a lot with the leaning community and how much they think that they belong in that community because the more they feel like they are part of something the more responsibility they would have and more they would like to make that community grow instead of thinking as individuals they´ll think more like they are part of something bigger." | Metacognition. assumption of responsibility |

**Source:** Focus group held in June (2020).

Teachers take very seriously the instruction of the 21st century skills. Teachers are always in search of updating the information about the best way for improving their teaching strategies. One of the main skills to develop is the correct use of ICT and information literacy which are very used in their works. The institution makes a point on making the students see and analyze social problems and promote responsibility in their classes, so they develop the tools to acquire the skills.

**Question 2: What are the students' levels of knowledge and use of the 21 century skills?** All participants answered to a Likert questionnaire to determine their knowledge about the 21st century skills at the school context. See table 3.

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Table 3. Students' knowledge and usage of 21 century skills at school context.

| Items | TD | D | ND/NA | A | TA |
|---|---|---|---|---|---|
| 1. I am familiarized with 21st century skills. | 11.8 % | 11.8% | 29.4% | 23.5% | 23.5% |
| 2. I believe that they teach us the 21st century skills. | 5.9% | 5.9% | 58.8% | 23.5 | 5.9% |
| 3. I apply the ways of thinking (creativity, critical thinking, problem solving, decision making) in my classes. | 5.5% | 0.0% | 23.5% | 41.2% | 29.4% |
| 4. I apply the ways of working (communication and collaboration) in my scholar activities. | 0.0% | 5.9% | 23.5% | 35.3% | 35.3% |
| 5. I know how to use ICT´S for schoolwork and homework. | 5.9% | 11.8% | 29.4% | 41.2% | 11.8% |
| 6. My school teaches me about social and personal responsibility, life and career. | 11.8% | 23.5% | 23.1% | 17.6% | 23.9% |
| 7. I know the necessary about 21st century skills. | 5.9% | 23.5% | 35.3% | 29.4% | 5.9% |
| 8. In my classroom, teamwork is promoted using 21st century skills. | 5.9% | 11.6% | 29.4% | 35.3% | 17.6% |

**Source:** Project registers (2020).

The participants' answers show that items 4 and 6 reached the higher level in total agreement. Both items are related to social communication and collaboration. Items 3, 5, and 8 got the level of agreeing to represent the creativity, use of ICT, and teamwork. However, the highest score reached appeared in item 2, showing learners are unsure if they learn about 21st-century skills in school.

In the figure 1, it is possible to see the participants perception about their ways of their thinking. It shows a positive moderated trend in experimental group for creativity, critical thinking, problem solving, and decision-making skills.

In the figure 2, it is possible to see the communication and collaboration participants skills. It shows an intensive positive trend in experimental group communication and participation skills.

Figure 1. Students` perceptions about their ways of thinking
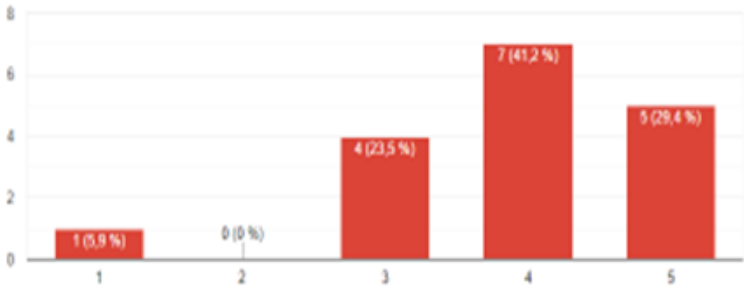


**Resource:** research project register (2020).

Figure 2. Students' perceptions about their communication and collaborations skills
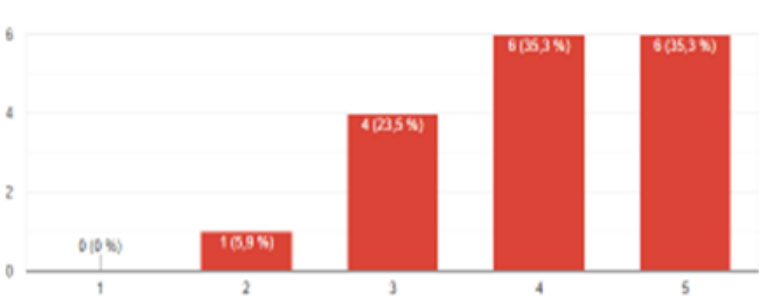


**Resource:** research project register (2020).

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**How to prepare an educational intervention to strengthen the 21-century skills in Elementary education?** The educational intervention plan proposed for the authors for improving the primary education students' 21st-century skills considers the Peters-Burton et al. (2018) and Gonzalez (2020) recommendations for The teaching of 21st century skills: (1) Remain child centered, (2) Promote self-esteem, (3) Encourage play for learning, (4) Encourage cooperation and interaction, (5) Maintain interconnections between virtual and real life, (6) with fun activities at home or in the classroom, (7) Promote being flexible but constant, (8) Adapt activities according to children's ability, (9) innovate evaluation at school, (10) promote organization and prioritization, and (11) Combine the different areas of learning. It also, considered the students' ideas to practice the 21st century skills in the Ecuadorian primary education context. (Figure 3).

Figure 3. Students' ideas to promote the 21st century skills in the school context

| |
|---|
| Participating in environmental group projects. |
| Team activities with riddles. |
| Treasure hunt around the school while solving problems. |
| **Solving logic problems through games**. |
| Technology and social networks to share news about social, ethic situations giving opinions and ways to help. |
| **Making videos about social problems** |
| Doing Science experiments about environment. |
| Researching about an interesting topic of the students' choice and doing a presentation about it. |
| **Starting smalls business ideas to launch and manage in groups.** |

**Source:** Voices of the participants of the experimental group (Sep/2020).

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In the table 4 the research team present a didactic for the instruction of the 21st-century skills in primary education since the English as Foreign Lnguage Class.

Table 4. Educational Intervention plan for teaching
21st-century skills in primary education

| Methodology and materials | Learning objectives | Teaching stages | Learning evaluation |
|---|---|---|---|
| **Session 1: The colors** | | | |
| Gamification, Direct Method.<br><br>Power point presentation Sheet of paper Colored pencil. | Students will be able to recognize the colors in English through realia. | Topic presentation<br><br>Vocabulary activity<br><br>Autonomous activity<br><br>Reinforcement activity | Students draw a geometric shape and then they had to color the shape with one of the colors learned in class. |
| Class observations: The students were able to understand the topic easily. The students learned the colors in English.<br><br>The children were able to understand the topic very rapidly.The presentation showed in class made it easier to make connections about the topic. | | Challenges: Lack of instructions before class about participations polices.<br><br>Lessons learned: Preparing beforehand for any unexpected situations that could arise mid- lesson. | |
| **Session 2: Moral dilemas** | | | |
| Direct Method.<br><br>Metacognition.<br><br>Flash Cards, sheets, pencil. | Students at the end of the class can understand a difficult situation and analize the option to solve it. | Warming<br><br>Topic presentation<br><br>Activities<br><br>Explanation activity<br><br>Reinforcement activity | Students analyzes an action they have not done a correct behavior. They talk about it during class and look for having better behavior. |
| The first class being directed towards an older group of students, it was not able to deepen in meaning or analyzation with the students.The process of explaining how to decide was not as satisfactory as expected. | | Achivements: The students were able to understand the importance of helping other people. The students were able to think about the best option to solve a difficult situation.<br><br>Lessons learned: How to motivate students when they are ashamed to speak | |

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| Session 3: Critical thinking and metacognition | | | |
|---|---|---|---|
| Communicative method.<br><br>Index cards, sheets, pencil. | Students at the end of the class can define and describe critical thinking. Generate examples of critical thinking and metacognition. Solve problems using critical thinking skills. | Warming<br>Topic presentation<br>Activities<br>Explanation activity<br>Reinforcement activity<br>Conclusion | The students do some Q and A asking and answering questions about what critical thinking and metacognition |
| Observations: The children were able to understand the topic very rapidly and how apply metacognition and critical thinking in their classes. | | Achivements:The students were able to understand the concept of critical thinking and metacognition through exercises with problem solving activities.<br><br>Lessons learned: How to explain difficult topics to children and do not make them feel bored. | |
| Session 4: Critical thinking and creativity: people´s different abilities. | | | |
| Communicative Approach.<br><br>Electronic device, sheets, color pencils. | Students at the end of the class will understand that everyone is different and what can they do when facing a bad situation. | Warming<br>Topic presentation<br>Activities<br>Explanation activity Reinforcement activity Conclusion | Students write a reflection of the topic and answer questions and what they would have done instead. |
| Observations: The children were very enthusiastic to participate during the class. Even though the children were able to understand the definition of the topic, they had some complication when describing the meaning of it with their own words. The students were able to think about solutions to injustice being done in the classroom to another classmate. | | Achievements: They were able to use creativity and show their emotions through their drawings. They also gave their opinions very respectfully.<br><br>Lessons learned: How to give queues to help students to give their ideas with clarity and explain bad actions in the classroom with examples | |

**Source:** Researcher team observations (Jun-Sep / 2020).

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**Question 3: What are the changes reported in the students' critical thinking?** The changes in the experimental group concerning to critical thinking behavior are presented below. See table 5.

Table 5. Changes in critical thinking of the experimental group

| Student | Pretest | Pos-test | Contrast | Student | Pretest | Pos-test | Contrast |
|---------|---------|----------|----------|---------|---------|----------|----------|
| 1 | 6.00 | 8.00 | +2 | 16 | 8.00 | 10.00 | +2 |
| 2 | 1.00 | 3.00 | +2 | 17 | 1.00 | 4.00 | +3 |
| 3 | 3.00 | 6.00 | +3 | 18 | 5.00 | 6.00 | +1 |
| 4 | 2.00 | 5.00 | +3 | 19 | 6.00 | 8.00 | +2 |
| 5 | 6.00 | 7.00 | +1 | 20 | 6.00 | 7.00 | +1 |
| 6 | 4.00 | 5.00 | +1 | 21 | 7.00 | 8.00 | +1 |
| 7 | 4.00 | 6.00 | +2 | 22 | 2.00 | 3.00 | +1 |
| 8 | 5.00 | 7.00 | +2 | 23 | 6.00 | 7.00 | +1 |
| 9 | 2.00 | 5.00 | +3 | 24 | 4.00 | 5.00 | +1 |
| 10 | 7.00 | 8.00 | +1 | 25 | 6.00 | 9.00 | +3 |
| 11 | 2.00 | 3.00 | +1 | 26 | 1.00 | 4.00 | +3 |
| 12 | 2.00 | 4.00 | +2 | 27 | 3.00 | 4.00 | +1 |
| 13 | 5.00 | 9.00 | +4 | 28 | 6.00 | 7.00 | +1 |
| 14 | 4.00 | 7.00 | +3 | 29 | 8.00 | 10.00 | +2 |
| 15 | 5.00 | 7.00 | +2 | 30 | 2.00 | 4.00 | +2 |

**Source:** research reports (2019-2020).

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## Hypotheses evaluation

Ho1: There are no significant differences between pretest and posttest in the forms of critical thinking before and after the process.

| Normality Series Test | | | | | | |
|---|---|---|---|---|---|---|
| | Kolmogorov-Smirnova | | | Shapiro-Wilk | | |
| | Statistic | gl | Sig. | Statistic | gl | Sig. |
| Pretest | ,159 | 30 | ,051 | ,930 | 30 | ,050 |
| Post-test | ,151 | 30 | ,078 | ,946 | 30 | ,136 |
| a. Correcton of the signification of Lilliefors | | | | | | |

| Related samples test | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Differences related | | | | | t | gl | Sig. (bilateral) |
| Par 1 | Mean | Deviation típ. | Error típ. of mean | 95% Confidence interval for the difference | | | | |
| | | | | Inferior | Superior | | | |
| Pretest Post-test | -190,00 | 88,47365 | 16,153 | -223,0366 | -156,963 | -11,763 | 29 | ,000 |

The T student test was administered to verify the hypothesis raised. The result p-value = 0.000 <0.050; therefore, the null hypothesis is rejected, and the alternative hypothesis is accepted, which means that the changes in the use of critical thinking by students is significant.

Ho2: There are no significant differences between the results of the control group and the experimental group regarding critical thinking before and after the process.

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| Normality Series Test | | | | | | |
|---|---|---|---|---|---|---|
| | Kolmogorov-Smirnova | | | Shapiro-Wilk | | |
| | Statistic | gl | Sig. | Statistic | gl | Sig. |
| VAR00001 | 0,156 | 29 | 0,069 | 0,934 | 29 | 0,068 |
| VAR00002 | 0,155 | 29 | 0,072 | 0,95 | 29 | 0,181 |
| VAR00003 | 0,156 | 29 | 0,069 | 0,934 | 29 | 0,068 |
| VAR00004 | 0,156 | 29 | 0,069 | 0,934 | 29 | 0,068 |

**a. Corrección de la significación de Lilliefors**

| | | | |
|---|---|---|---|
| 430 | 30 | 213,59 | 38,99602 |
| 620 | 30 | 205,77859 | 37,56986 |
| 404,1379 | 29 | 139,75788 | 25,95239 |
| 404,1379 | 29 | 137,46473 | 25,52656 |

**Related samples test**

| Differences related | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean | Deviation típ. | Error típ. of mean | 95% Confidence interval for the difference | | t | gl | Sig. (bil) |
| | | | | Inferior | Superior | | | |
| Experimental group Pretest Post-test | -190,00 | 88,47 | 16,153 | -223,03 | -156,96 | -11,763 | 29 | 0,000 |
| Control group Pretest Post-test | 0,000 | 10,000 | 1,856 | -3,803 | 3,8038 | 0,000 | 28 | 1,000 |

The T student test was administered to verify the hypothesis raised for the experimental group. The result *p-value = 0.000* <0.050; therefore, the null hypothesis is rejected, and the alternative hypothesis is accepted, which means that the changes in the use of critical thinking by students of the experimental group is significant.

Meanwhile, the T student test was administered to verify the hypothesis raised for the control group. The result *p-value = 1.000* >0.050; therefore, the null hypothesis is accepted, which means that the changes in the use of critical thinking by students of the experimental group is not significant.

## Discussion

Based on the literature review and results obtained in this research, the authors ratify the position of Germaine et al. (2016, p. 12) when they argue that "Critical thinking and problem-solving skills, include reasoning effectively, using systems thinking, making sound judgments and decisions, and solving problems." Thus, this project shows that when students demonstrated the capacities of each skill through practical reasoning that was made as a group, they ended up with a positive outcome.

Besides, (Ainscow, 2015) education concerned with giving an educational response attentive to each student's differences and achieving good academic and professional results for all. In agreement with this statement, the students' environment proves to be very inclusive and makes an excellent space to work with because the students of the experimental group were aware of the importance of inclusion within the class and how this helps develop equity and values in the class society.

Besides, the results obtained in this research ratify the position of Stehle and Peters-Burton (2019) concerning communication and collaboration skills improve the construction of knowledge process.

Teaching more than just meaningless words will have a good impact on the students' lives because they understood that making good decisions when facing challenges can help them be conscious about the consequences of their actions and how that affects other people.

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In the country's education, there has been a desire to improve the contents provided to the students every year, but that should not be the only aspect in education that the school system should consider. The abilities

and skills should also be an essential point to work on it. Thus, emerges the need to research and apply the 21st-century skills developed by the ATC21st project. Early in the present year, the Education Ministry, in coordination with the Organization of Iberoamerican Estates, launched the course "Training of skills and competences for the 21st century of the Directors and Rectors of public establishments of the Ecuadorian education system", which general objective is to develop the necessary skills of the principals of Ecuadorian public institutions in order to improve their performance according to the challenges of 21st-century education. Although, its administrative staff does affect the teaching staff because it influences their content and material. With that said, the survey results (diagnosis) showed that the two involved teachers do know about the mentioned skills, and they do promote their application. However, it gave the impression that they do not know what other activities can increase such skills. It was noticeable that the students could use critical thinking and problem solving to create awareness about the importance of inclusion and internalize the knowledge of being in an environment where they will have consequences depending on their decision. Possibly, the execution of this research project can reach different achieve face-to-face than online classes. Since most students feel more motivated to participate in the class' tasks, most learners and teachers are still unfamiliar with the virtual teaching modality. Also, it is probably better to teach English in a presential modality due to the interaction and engagement needed that is sometimes not wholly achieved in online classes.

## Other findings:

At the beginning of this research, it was not intended inclusion to be part of this project, but as the research got more profound in the class dynamic comprehension, it was clear that one of the main characteristics of cultural awareness skills.

The most surprising thing found for the research team was the students having some knowledge about what we thought were going to be such

complicated and challenging topics for children of that age because they could master this topics very quickly without any issues.

Finally, the virtualization of education allows students not be forced to turn on their cameras. Therefore, teachers can not completely assure that students are learning and applying the 21st-century skills since, more often than not, teachers assume or suppose students are learning, but it is difficult to get a clear picture of the learner's thinking process.

## Conclusion

Considering the literatura review and empiric results obtained in this study, it concluded that the skills of the 21st century put into practice in the participating students have grown in critical thinking in 100% of the experimental group participants, while the control group did not report changes. These are skills that enhance students' performance in using technologies, sustainable development, and decision-making. The weakness of this work is perhaps the limited corpus that prevents generalizing but proposes a work path for strengthening the competencies of the 21st century to advance its extensive practice. The contribution of this work is that it allows the implementation of corrections in the curricula to advance towards the construction of more inclusive, progressive, and sustainable societies. Besides, the decision making and resolution of real-world problems skills are not easy to teach, especially in secondary education. Thus, authors invite other researchers to carry out future studies aimed at strengthening the skills of the 21st century.

## Acknowledge:

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