Post COVID-19 Macrotrends in the Pedagogical Practice of Professors

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Abstract. The temporary lockdown of Educational Institutions provoked scenarios of emergency against the Global Crisis of the COVID-19. Which global macrotrends can be applied in the context of a Post COVID-19 pedagogical practices? Three categories were identified: I) Global macrotrends related to the Education Sector; II) The Post COVID-19 pedagogical practice, as a role assumed by the professor involved in the different education spaces (academicist, technological, cultural interpretative, socio-critical and socio-formative); and III) Student Outcomes (SOs), the accreditation model. Global macrotrends were selected to be applied in the post COVID-19 pedagogical practice that contribute to accomplishment of SOs and were consequently classified into three areas: i) Cross-cutting Macrotrend (public awareness), ii) the Macrotrend of Post COVID-19 pedagogical practices (Disrupting Education: the assessment of progress, harnessing innovation, multiple senses, co-creation, instant entrepreneurship, the User Experience business-focused model approach for education, and gamification), and iii) the Macrotrend of Support (Networking & Technology).

Keywords: COVID-19, global macrotrends, higher education, pedagogical practice, professor development.

1 Introduction

Currently, Perú faces one of the biggest educational crisis as a result of the pandemic produced by the Coronavirus Disease 2019 (COVID-19), transforming the on-site educational system into e-learning or remote one as a result of the state of emergency. In 2019, the Organization for Economic Cooperation and Development (OECD) claimed that an answer to this current educational crisis will require smart strategic systems that can be adapted to face dynamic challenges; plus, OECD pointed out the relevance of supporting solid investigation systems as well as the development in education, re-designing both the learning and teaching processes. In accordance with the current context, current global macrotrends from the education system – that can be employed in the Post COVID-19 pedagogical practice in order to achieve Student Outcomes (SOs) accreditation model – were chosen [1]. In the last months of the educational emergency provoked by the spread of COVID-19, UNESCO has systematized and broadcasted government initiatives implemented by Latin American educational systems, focused

on sharing government planning actions adopted by the different entities from its education sector; as well as, established strategic alliances within those groups and other sectors of interest involved in current scenarios, in order to ensure educational continuity, in the framework of distance learning, based on internet usage and other means of communication [2].

This has implied the consideration of certain aspects within the agenda of education policies, such as the design of strategies that address the complexity of the current educational situation in relation to the adequacy of curricular plans, evaluation systems, teaching methodologies, and student's and professor's overall wellbeing; just like the reduction of gaps: digital competencies, connectivity and access to informatics and technological equipment usage, among others. Furthermore, the preparation and the differentiation of specific labor are acquired in the exercise of teamwork and communicative skills within multidisciplinary teams, because a person on his/her own can't have all the necessary skills and competencies to solve new tasks. Therefore, the importance of communicative and socio-psychological of Engineering education is growing. For this reason, it is important to consolidate integrated education systems; that is to say, there should be a collaboration between universities and the aforementioned industry, where Engineering students can combine both the academic learning experience and the acquisition of a part-time job. In other words, an en-bloc modular education system.

2 Contextual frameworks

2.1 Post-COVID19 Global Macrotrends from the education sector

The current trend consists of multilevel teaching that is student-oriented and competency-based – with engineers that are ready to continue – which highlights the need for a change in the educational/professional paradigm, urged by globalization, the fast development of innovative technologies, the social development, the instability and the variability of the contemporary world [3]. In April 2020, the United Nations Educational, Scientific and Cultural Organization (UNESCO), in collaboration with the International Institute for Higher Education in Latin America and the Caribbean (IESALC in Spanish) claimed that initiating schooling through a virtual mode is not such an easy task to achieve, since many countries lacked the preparation for a large-scale disruption like this.

Also, because education actors believe that the development of competencies can't be achieved through digital tools or videos, taking into account that the COVID-19 pandemic affected roughly 1570 million students in 191 countries, being 23,4 million higher education students, and 1,4 million professors from Latin America and the Caribbean [4]. Likewise, they consider that maturity to face the actual problems is needed, due to the fact that the dynamic changed and is time to seize this context for redesigning the education processes, that involve the analysis of the different resources at disposal, that can contribute to solve gaps of connectivity, lack of digital technological resources in both professors and students (educational technology), lack of articulated online

contents with study plans; as well as professors and students prepared for this "new normality", among others.

In light of this, in the middle of the 1st semester of 2020, Trends Shapping Education Spotlight 21 and Ipsos Macrotrends have pointed out that education should analyze and adopt certain Global Macrotrends (GMTs), such as [5]: GMT.1) Public awareness: it involves the compliance of rights and duties within the framework of a democratic citizenship, that promotes civic and social participation among students and within every person. To this end, educational programs, projects, and subjects aligned with this cross-cutting competency are needed with the intent to prepared students for full citizenship. GMT.2) Progress assessment: it's a systematic analysis that will allow the acquisition of competencies naturally based on the formative assessment for the permanent learning process, regardless of time and space. In other words, learning from failure or mistakes should be allowed, considering the ubiquity of learning, and designing pedagogical measures to ensure a formative assessment (diagnostic, formative, and summative assessment).

GMT.3) Co-creation: it's a strategy meant for the consolidation of professional networks for professors or the collective knowledge of the teaching practice. GMT.4) UX-focused teaching: the User Experience-focused model approach for education (UX) is an approach that prioritizes a student's needs, in accordance with the experience of every professor, making interaction and communication simple and easy by helping to overcome challenges. GMT.5) Gamification: it's important to consider this in terms of educational transformation, as an opportunity to motivate and improve group dynamics, as well as a critical, reflective focus by students, in order for the aforementioned strategies to attain greater significance in both an attractive and competitive world.

GMT.6) Harnessing innovation: a process that allows making the best decisions regarding technology usage, creating a balance between what has and hasn't worked out. And, to whom this was useful. GMT.7) Instant entrepreneurship: mainly defined in entrepreneurship and self-employment. GMT.8) Networking & Technology: fundamental for the creation of new environments (both artificial and human) of communication, establishing those tools as new ways of interaction, based on innovative digital solutions for education.

2.2 Pedagogical practice

In 2020, OECD targeted three aspects that professors should consider in order to ensure the continuity of a high-quality educational service: (a) Cognitive skills, in reference to cognitive skills, processing, creativity, and knowledge; (b) Interpersonal skills that include teamwork skills and leadership, and (c) Intrapersonal skills, oriented to intellectual openness, work ethic, responsibility and self-efficacy [6]. When thinking about consolidating Public Awareness as a GMT.1), it is important to consider the articulation of democracy and social justice within a society, where said relation should be developed from (5) main dimensions that could originate from educational institutions. Among them, the redistribution of opportunities and the benefits of education, the recognition of cultural values and social diversity, school governance, a critical and participatory curriculum and democratic school culture.

In this regard, it becomes necessary to focus the professor's role in aspects such as: the promotion of democracy and social justice from democratic participation in the context of equal opportunity, recognizing cultural values in accordance with cultural diversity, with inclusion and respect of the different lifestyles, with inherent co-responsibility to new scenarios, pondering the development of critical and participatory thinking based on the appreciation of experiences and knowledge possessed by local communities, and adopting a democratic culture for learning achievement [7]. In relation to the foundation of the GMT.7) Instant Entrepreneurship, these new Post COVID-19 scenarios demand the development of new roles and responsibilities within the student, in such a way to allow him/her a meaningful and efficient learning process. As far as the professor's role concerns, he/she must promote self-regulated and autonomous learning strategies in flexible working environments, ensuring a student autonomous, active and self-regulating participation, which will prove valuable in these new scenarios and, that can allow a systematic change that enhances the personal construction of learning by the student, fostering meaningful learning experiences [8].

For the GMT.6) Harnessing innovation, as well as GMT.8) Networking & Technology, it's fundamental to develop the field, known as The Learning Analytics (LA), which allows obtaining information regarding the interaction between professors and students with virtual learning environments and the use of technology tools that support the teaching-learning process. Furthermore, in the context of Information and Communications Technology (ICTs), the use of tools for Learning Analytics should be considered for the purpose of helping the teaching practice in the evaluation of educational resources that are meant to be inclusive, available and valuable, and focused on digital competencies as a tool that contributes to the creation and assessment of meaningful learning experiences.

On the other hand, the development of the GMT.3) Co-creation should be focused to highlight the co-creation of adaptive components for a virtual learning platform that these new Post COVID-19 scenarios require, through the innovation, adaptability and identification of expectations from the people concerned with no inhibitions whatsoever, in trusted environments with ideas generated and arisen from an innovative, proactive and creative environment [10]. Therefore, collaborative approaches ought to be utilized in order to allow a wider range of action and contributions made in that regard. Thus, the personalization of contents in virtual learning platforms, as well as the co-evaluation, could fall into an inefficient work, if the professor doesn't empower him/herself throughout good practice that allows him/herself to generate an efficient performance, expertise and strengthening of activities in the virtual model.

When talking about the GMT.2) Progress assessment; just as the GMT.4) UX-focused teaching; it has to be taken into account that teaching practice increases in quality when there's a proposal of continuous improvement that fosters the systematization and communication of experiences from the university professor, based on the following strategies: an ongoing. Definitely, it's important to take into account the different factors that might influence the teaching practice, just as its improvement. For this reason, the direct experience contributes significantly and it's truly efficient in student learning.

Finally, the GMT.5) Gamification, which is significantly supported on the use of ICTs, is important in regard to the educational transformation as a learning strategy, since the student is able to make knowledge his/her own (besides the use of mobile devices or informatic equipment), which increases the motivation and leads to a better understanding, as well as their focus, through the promotion of critical thinking and creativity, this being quite a very versatile strategy for professors while teaching [12].

2.3 Student Outcomes (SOs) of the accreditation model

The student results are related to skills, knowledge, and behavior acquired by students throughout their process during the program", which promotes innovation in higher education. "Fig.1." presents the SOs, grouped in such a way that they can be considered as the 4 pilars of education according to The Delors Report [13].

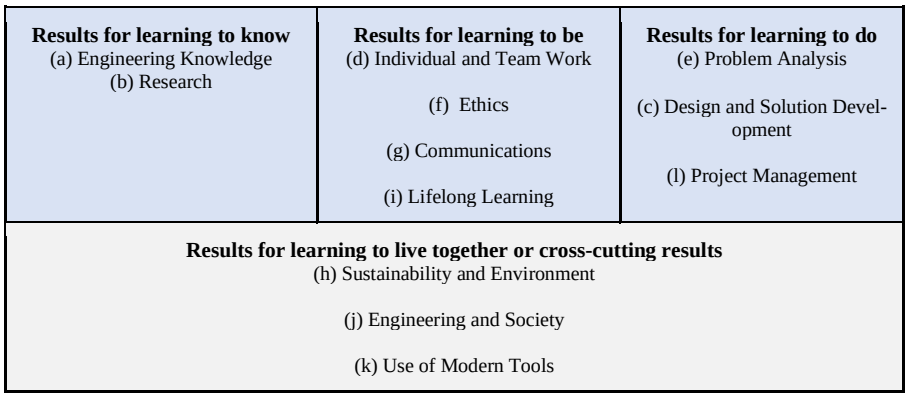

Fig. 1. Student Outcomes (SOs) accreditation model – Delors education pilars.

In the socio-formative model and the competency-based approach, the SOs can also be classified by general competencies that articulate SOs (d), (f), (g) and (i). Cross-cutting competencies are oriented to achieve SOs (h), (j), (k) and (l), as well as, technic competencies group SOs (a), (b), (c) and (e). To that effect, the 4 pillars of education and the 3 competencies that cover the SOs, should be taken into account while developing the pedagogical practice in the current scenario, articulating said actions with Post COVID-19 education macrotrends.

3 Methodology

The present investigation inquired: Which global macrotrends can be used in the Post COVID-19 pedagogical practice? For that purpose, the General Goal (GG) establishes general macrotrends that can be employed in the Post COVID-19 pedagogical practice to achieve the SOs. Besides, the following Specific Goals (SG): SG1. Identify global macrotrends related to the pedagogical practice; SG2. Identify the Post COVID-19 pedagogical practice that contributes to the achievement of SOs from accreditation model;

and, SG3. Determine the level that exists between global macrotrends that could be used in the Post COVID-19 pedagogical practice. Likewise, the research addressed qualitative and quantitative methods through the matrix of documentary analysis and the matrix generated from a rating scale that considered the socio-formal levels of Tobon; we worked with categories and subcategories identified according to documentary analysis, as well as the design and processing of information detailed below:

3.1 Categories and subcategories

If we take the current literature – regarding global macrotrends linked to the education system – into account, three categories can be identified:
I) Global macrotrends, that consider global trends related to the education sector.
II) Post COVID-19 pedagogical practice, understood as the role assumed by the professor in the different education spaces aligned with the didactic approaches (academicist, technology, cultural interpretative, sociocritical and socio-formative).
III) Student Outcomes (SOs) comprehends 12 subcategories: a) Engineering Knowledge, b) Research, c) Design and Solution Development, d) Individual and Team Work, e) Problem Analysis, f) Ethics, g) Communications, h) Sustainability and Environment, i) Lifelong Learning, j) Engineering and Society, k) Use of Modern Tools and l) Project Management. Likewise, from a qualitative approach we worked with categories and subcategories, as well as the design and processing of information detailed below:

3.2 Design and processing of information

The instruments to gather information were developed according to the Specific Goals. In that regard, it is shown that to get the SG1 a documentary analysis technique was utilized through a matrix of documents, which contains specialized information of current global macrotrends. The latter was reduced by selecting education sector-only trends. In order to identify global macrotrends that could be applied in the Post COVID-19 teaching practice, OECD's 2020 Methodology was taken into consideration [14].

The aforementioned examines four (4) indicators to create awareness about the influence of macrotrends in the education sector. These are: a) Tools for rigorous thinking, b) Education sector scope, c) Lines of educational research, and d) Teaching practice. In relation to this, macrotrends that contribute to the last indicator were analyzed. For developing the SG2, a matrix of documents – that contains curricular approaches and different roles assumed by professors who relate to these – was designed. A reduction of the said matrix was done, considering the Post COVID-19 pedagogical practice. 51 criteria were elaborated in accordance with the Student Outcome (SOs), which were related to global macrotrends to determine their level of contribution, in a quantitative manner, through a value scale that considered Tobon's definition of levels of the socio-formative approach by competencies (developed in 2017), levels for the assessment scale of Tobon's socio-formative competence approach (2017). Very Low (0-25%) it does not relate to the criteria; Low (26%-50%) it relates to some elements of the criterion; Middle (51%-75%) it relates to essential and basic elements of the criterion and High (76%-100%) it is related to essential elements of the criterion, achieving quality

impact. Furthermore, the triangulation technique was utilized in order to describe this relationship in a quantitative manner, and it was used through a matrix of triangulation by Stake and Forbes [15]-[16], to give a proper answer in relation to the SG3, regarding the teaching roles that contribute to the achievement of SOs from ICACIT accreditation model, and the macrotrends linked to the Post COVID-19 pedagogical practice.

4 Results and Discussion

4.1 Global Macrotrends related to the pedagogical practice

In accordance with 4 indicators by OECD (tools for rigorous thinking, educational sector scope, lines of educational research, and teaching practice), 10 macrotrends related to the education sector were obtained [17]-[18]. Nonetheless, for effects of the analysis, they were grouped as follows, according to "Fig. 2.": (1) Cross-cutting macrotrend: "Public awareness", that comprehends teaching roles to foster a democratic participation as well as the coexistence. Secondly, (2) Macrotrend in the pedagogical practice: "Disrupting education", focuses on the assessment of progress, harness innovation, multiple senses, co-creation, instantaneous entrepreneurship, User Experience-focused model approach for education (UX), and gamification; considering the latter as an essential part of the discussion and approach in regard to the pedagogical practice itself, according to the role assumed by the professor, the role of the student, the role of evaluation and the professor-student interaction. Likewise, (3) Macrotrend of Support: "Networking and Technology". It contemplates support given by technology and internet during times of crisis and constant change.

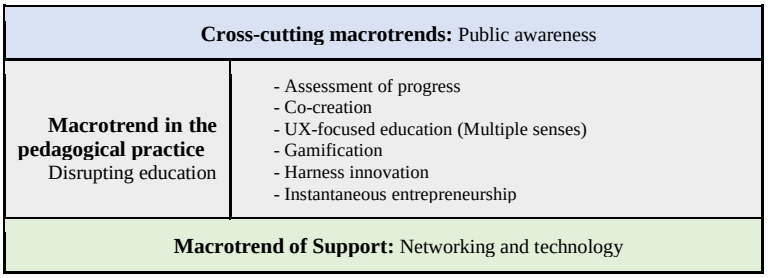

Fig. 2. Global macrotends that could be implemented in the pedagogical practice

4.2 Post COVID-19 pedagogical practices that contribute to the achievement of SOs

It was evident that teaching roles generated by curriculum approaches (such as the academicist and the technology one) don't contribute to the development of SOs. Whereas, roles promoted by the cultural interpretative, sociocritical and socio-formative curriculum approaches, contribute significantly to the achievement of SOs. In that sense, it is shown that the professor's role: "Foster democracy and social justice" is related to the SO to learning to be, which comprehends:

Team and Individual Work, Ethics, Communications, Lifelong Learning. Likewise, as a result of the analysis it is shown that all the OSs to learning to know (Engineering knowledge and Research) and learning to do (Problem Analysis, Design and Solution Development, and Project Management) develop with the professor's roles themselves, which are: Foster autoregulated and autonomous learning strategies, Foster analysis of research and information, Harness ICTs, evaluate learning and Create innovative methodologies. Finally, the SOs to learning to live together (Sustainability and Environment, Engineering and Society, and Use of Modern Tools) are fostered with the aforementioned (6) professor's roles.

4.3 Global macrotrends that could be implemented in the Post COVID-19 pedagogical practice to contribute to the achievement of Student Outcomes

To respond to SE3, it has been necessary, on the one hand, to identify the level of incidence of macro-trends in the development and acquisition of the Student Outcomes; and on the other, mention what roles the engineering professor should assume in pedagogical practice according to the macro trends that contribute to the achievement of these Student Outcomes. 51 criteria have been established, where essential elements of the SOs are extracted to analyze them in the light of pedagogical macro trends. For this, a four (4) level assessment scale has been made: very low, low, medium and high. (See Table II). From this, it was obtained that:
- The macro trends of Co-creation and instant Entrepreneurship achieve a high level of relationship, since they include essential elements (criteria) of the SOs, achieving quality impact; -Teaching macrotendencies UX focued education, taking advantage of innovation and technologies and interconnection, manage to relate to essential and basic elements (criteria) of the SOs. This places them at a medium level; - The macrotrends of public awareness and Gamification are located at the low level, since it manages to relate to some elements of the SOs; - The progress assessment macro trend has achieved a very low level of relationship. It is worth mentioning that the analysis described has been carried out in a general way, the level of macrotrend relation varies according to the SOs; therefore, this study shows that the professor must orient his pedagogical practice according to the SOs that he intends to develop.

The macrotrend in the pedagogical practice: "Disrupting Education", takes five aspects into account: (a) The assessment of progress refers to the design of pedagogical measures to guarantee formal education that allows ongoing feedback, without considering neither space or time as obstacles. Also, it values the importance of learning from mistakes and failures. This is related to the role "evaluate learning" and "create innovative methodologies", since it brings up the importance of documenting and systematizing pedagogical changes translated from evaluation and its impact at the same time. These roles are associated to the SOs "learning to know", "learning to do" and "learning to live together" [19]. (b) "Co-creation" considers it essential to create collaborative work between professor s and students with the aim of creating collective knowledge. This is linked to the professor's role to "create innovative methodologies". (c) "UX-focused education" promotes the design of meaningful learning experiences through the identification of students interests and needs. This is linked to the professor's role

to “foster autoregulated and autonomous learning strategies” and to “create innovative methodologies”.
(d) “Gamification” proposes the design of game-related learning experiences and competitiveness; This is directly connected with the professor’s role to “create innovative methodologies” and “evaluate learning”. (e) “Instantaneous entrepreneurship” promotes autonomous work and entrepreneurship, which is linked to the professor’s role to “foster autoregulated and autonomous learning strategies”. The last one, “harness ICTs” fosters the planning of learning experiences in an interdisciplinary and multidisciplinary manner, which sets the professor’s role for “fostering analysis of research and information”. These roles, configured by macrotrends, allow the development of SOs to “learning to know”, “learning to do” and “learning to live together”.
(f) The Macrotrend of Support: “Networking and Technology” promotes digital coexistence, the use of tools for remote collaboration and platforms of online streaming, the assurance of cyber safety, learning to consider Augmented/ Virtual Reality, Robotics and Artificial Intelligence, and the use of innovative digital solutions for teaching. In that sense, this macrotrend is directly related to the six teaching roles in the present investigation. Likewise, it can be inferred that this macrotrend provides support to the development of the four SR groups: learning to be, learning to know, learning to do and learning to live together.

5 Conclusions and Future Work

The macrotrends constitute a global perspective of the education sector that contributes to the rethinking of pedagogic practice, and with this, to the configuration for the development of knowledge, in such a way that innovation can be seized, with the support of networking and technology. Likewise, it weights co-creation and instantaneous entrepreneurship, considering both harnessing innovation and the application of the design process of UX-focused education. The professor is conceived as an agent that encourages students, designing meaningful learning experiences. It is projected that he/she deconstructs the term “evaluation” to structure it as part of the ongoing improvement of learning, leading to the development of the main purpose of education: transform society through a change of attitude and the practice of values that guarantee an integral high-quality education. On the other hand, lesson planning based on rote learning is expected to be avoided; in other words, from the conceptual content from syllabi, because students can check documents about each topic before the lesson, which will be dedicated to reinforce autonomy, talent, soft skills, digital coexistence and the resolution of problems-in context. Finally, global macrotrends to be used in the Post COVID-19 pedagogic practice, can be classified into three areas: Cross-cutting macrotrend (public awareness), pedagogic practice (Disrupting Education: assessment of progress, harness innovation, multiple senses, co-creation, instantaneous entrepreneurship, and education focused on the User Experience business, and gamification), and the Macrotrend of Support (Networking and Technology). In that sense, it is claimed that global macrotrends set Post COVID-19 pedagogical practices in such a way that they can enhance the teaching and learning strategies designed and planned.

References

1. OECD. Trends Shaping Education 2019. OECD Publishing, Paris (2019). https://doi.org/10.1787/trends_edu-2019-en.
2. SITEAL-UNESCO Homepage, Sistematización de respuestas de los sistemas educativos de América Latina a la crisis de la COVID-19, https://n9.cl/oveus , last accessed 2020/10/30.
3. Kupriyanov, R., Gorodetskaya, I.: Global trends in higher education and thier impact on engineering training in Russia, INTERNATIONAL CONFERENCE ON INTERACTIVE COLLABORATIVE LEARNING 2015, ICL, pp. 244-250, doi: 10.1109/ICL.2015.7318033. Florence (2015).
4. UNESCO-IESALC Homepage, COVID-19 and higher education: Today and tomorrow - Impact analysis, policy responses and recommendations, https://n9.cl/ylti , last accessed 2020/10/30.
5. OCDE.: Coronavirus special edition: Back to school. Trends Shaping Education Spotlights 21(1), Paris (2020). https://doi.org/10.1787/e6d23b76-en.
6. OECD Homepage, Supporting the continuation of teaching and learning during the COVID-19 Pandemic Annotated resources for online learning, https://n9.cl/xc2qm, last accessed 2020/08/01.
7. Belavi, G., Murillo, F.: Democracy and Social Justice in Schools: Dimensions for Thinking and Improving Educational Practice, REICE 18(3), 5-28 (2020). https://doi.org/10.15366/reice2020.18.3.001.
8. Pegalajar, M.: Individual Learning Strategies in Novels Students of Education, REICE 18(3), 29-45 (2020). https://doi.org/10.15366/reice2020.18.3.002.
9. Avila, C., Baldiris, S., Fabregat, R., Graf, R.: Evaluation of a learning analytics tool for supporting professors in the creation and evaluation of accessible and quality open educational resources. Revista británica de tecnología educativa (2010). doi:10.1111/bjet.12940.
10. González-Palacio, L., et al.: Cocreation of adaptative components for a virtual platform based on learning styles. 14TH IBERIAN CONFERENCE ON INFORMATION SYSTEMS AND TECHNOLOGIES 2019, CISTI, vol. 14, pp. 1-6. Coimbra, Portugal (2019). doi: 10.23919/CISTI.2019.8760858
11. Agirre J., et. al.: Mejora de la práctica docente – Una experiencia de autoevaluación. Eusko Jaurlaritza, Gobierno Vasco (2013).
12. Gonzalez, D., Gisbert, M., Fabregat, R.: La gamificación como estrategia para el acercamiento de la herencia cultural en Girona. XXII CONGRESO INTERNACIONAL EDUTEC 2019, vol. 1, pp. 1447-1460. PUCP, Perú (2019).
13. Delors, J.: La educación encierra un tesoro. UNESCO, Madrid (1996).
14. OECD Homepage, Trend Analysis as a Method. Schooling for Tomorrow. Knowledge Bank, https://n9.cl/bcwc1, last accessed 2020/11/7.
15. Stake, R.: La triangulación. La investigación con estudio de casos. 2nd edn. Morata, Madrid, (1999).
16. Heale, R., Forbes, D.: Understanding triangulation in research. Evidence -Based Nursing. 16(4), 98-113 (2013).
17. IPSOS Homepage, Global Trends. Understanding Complexity. The UK Trends and Futures Team, https://n9.cl/wvbrv, last accessed 2020/02/07.
18. TRENDHUNTER Homepage, Special Report. The New Normal, https://n9.cl/46dx, last accessed 2020/02/07.
19. TOBÓN, S. Evaluación socioformativa. Estrategias e instrumentos. Kresearch, EEUU (2017).