Mobile Learning and Artificial Intelligence to improve teaching-learning process in ICT global market age

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Abstract. Opportunities offered through mobile devices in education are debated in the pedagogical scientific community in last years, since they were realized that contemporary society has undergone significant changes, in conjunction with a noteworthy spread of technological tools. More in details, PCs, tablets, smartphones, have become part of every individual's life in a pervasive way, becoming indispensable and, in some ways, they are conditioning each life, thus they are conditioning education and the teaching-learning process. Among various opportunities offered by Media Education. More in details, in this work it is a broad range exploration of some relations that M-Learning and Artificial Intelligence have with ITC global market and Sub-Saharan higher education.

Keywords. M-Learning - E-learning - Bloom taxonomy - Sub-Saharan higher education - distance education.

> Artificial intelligence would be the ultimate version of Google. The ultimate search engine that would understand everything on the web. It would understand exactly what you wanted, and it would give you the right thing. We're nowhere near doing that now. However, we can get incrementally closer to that, and that is basically what we work on.
>
> Larry Page,
> co-founders of Google

1. Introduction to M-Learning

In our society, it is a fact that technological tools have changed, or at least modified, almost every ways of teaching-learning and these tools have become a real support for educational processes; in detail, progressive dissemination of these technologies it has been unstoppable especially since the personal computers, that were on the desks of our

house and offices, were supplanted by mobile devices always connected to the Internet. Moreover, such as Larry Page said, Artificial intelligence should be the ultimate version of any Internet search engine that will be used, from teachers and students, also for educational purposes. Some years ago, Seipold[1] did not consider his mobile device to be obvious in the formal teaching-learning process. In fact, debates were concentrated on the legitimacy of using devices designed for other activities in the school. Deepening his study, Seipold could be seen how mobile technologies can represent a universe of opportunities for school learning and teaching; it was, therefore, necessary a definition of Mobile Learning (also called as M-Learning), to create necessary boundaries between educational use of a mobile device and informal entertainment of the same device. The first meaning of M-Learning can be as each learning environment that is evolved in Distance Learning and E-Learning platform, such as, for example, online university courses[2] done through mobile devices. However, over time, there has been a different approach to M-Learning which prefigures its use within traditional school classes and within specific projects which, not only have a purpose of increasing the level of interaction between teacher and students but also it can represent an aid for the integration of those subjects where there are students' learning difficulties to improve knowledge and skills. From a didactic point of view, comparing the distinctive characteristics and possibilities offered form E-learning versus M-Learning ones, these learning approaches differ considerably; in the first case, lessons are done essentially as laboratories, with assignment, tasks and standardized tests, besides, lessons time is established and by an e-mail, or platforms with consequent delay in replies and feedback. M-Learning, on the other hand, is much faster both in proposing tasks and in verifying results because using mobile devices, which by definition are immediate in the use of the services they allow, the sending of the activities carried out and the feedback takes place in a timely, also through the use mobile technologies[3]. Again, some specific characteristics can be highlighted to define M-Learning exactly, essentially, there is a different perspective, form E-Learning, in these approached because it M-Learning is a learning way with the help of mobile devices and software applications developed for mobile phones, smartphones, tablet and mobile multimedia devices[4]. Although, all training mediations have as an objective, also, acquisition of knowledge, for M-Learning this purpose takes a more complex nuance because the teaching-learning process is stimulated in a different way, i.e. it is assisted by a possibility of dealing in real-time with interlocutors (both teacher than students) and from everywhere; moreover, these "debaters" share the same needs and the same expressive language modalities[5]. All these, over the years, has become increasingly true, because the M-learning platforms have started to copy the graphic

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[1] See Seipold, J., *Designing Mobile Learning in School Contexts. Considerations and Examples for Practice. London Mobile Learning Group*, 2020, http://www.londonmobilelearning.net/downloads/JSeipold_Planning-MobileLearning-in-School_2012-02-08.pdf (ver. 08.12.2020).

[2] See Tavella, M., & Ott, M., *E/M-Learning tools in the inclusive classroom*. In 12th International Technology, Education and Development Conference Valencia. 2018. https://doi.org/10.21125/inted, 2018 (ver. 23.04.2021).

[3] Mehdipour, Y., & Zerehkafi, H., *Mobile Learning for Education: Benefits and Challenges*. International Journal of Computational Engineering Research, 6(3), 2013, pp.93-104.

[4] Hug, T., *Mobile learning as' microlearning': Conceptual considerations towards enhancements of didactic thinking*. International Journal of Mobile and Blended Learning, 2(4), 2012, pp-47-57.

[5] See Gee, J.,P., *Come un videogioco: insegnare e apprendere nella scuola digitale*. Cortina, Milano, 2013.

interfaces of social networks, for example, Edmodo with a design very close to Facebook. In other words, E-learning has remained very serious and formal, while M-learning has adapted to the trends of social media, which have converted their websites into apps for mobile devices. The similarity of the graphic interfaces has also allowed a very high learning speed of the M-learning environment, allowing students and teachers to quickly become very practical in the use of these platforms. Thus, M-learning can also be seen as a social process that it takes place in a context in which students collaborate with their peers and teachers to construct interpretations of the world around them[6].

2. Some threats of M-Learning technologies

Technologies "interpret" a worldview that results in a transposition process in which decision-making choices and mediating tools are involved. The use of modern telecommunications and information processing devices, however, must be both conscious and intentional otherwise the risks that can emerge are considerable: social isolation, emotional detachment from real life, etc. This increase in the number of devices on which distance learning is carried out requires an alignment of teachers with the continuous evolution of our society[7]; in this sense, the use of technologies in school and university contexts should express a culture capable of approaching the issue of progress with a critical attitude, overcoming a merely technical approach and bridging the digital divide that, for too long, has prevented its effective educational use. A digital divide that before was physical in nature (lacked broadband connection) is now related to skills (digital skills). It is configured, in this way, as a culture of progress referring to technologies that can open the window of distance learning on the opportunities offered by the knowledge of technologies as an engine of progress and at the same time a product of evolutionary processes. Nevertheless, it is worth mentioning in this article the risks of computer systems that will be examined here: the first is the security risk. Applications containing artificial intelligence software are very often in contact with or even integrated (and in the future increasingly so) with data related to the human body (geographic location, etc.) can be dangerous if poorly designed, misused, or hacked.

The second issue is that inequalities in access to information could be exploited to the detriment of some users, based on a person's network behaviour or other data used without their knowledge. The third issue is the accumulation of information that could also lead to a distortion of a possible online teaching-learning process: think of people who just keep their device on but are not following a lesson and other cheating factors. Finally, cyber-attacks are a constant danger; think especially of the lockdown period due to the Covid-19 pandemic, which highlighted the inadequate cyber preparedness on the part of teachers, compounded by some mischievous behaviours of some technology-awa-

[6] Arrigo, M., *Apprendere con le tecnologie mobili*. In D. Persico & V. Midoro (eds.), *Pedagogia nell'era digitale*, Edizioni Menabò, Ortona, 2013, pp. 77-82.

[7] Todino, M.D., Di Tore, S., Scarinci, A. (2021). *Didattica a distanza e cyber attacchi: quale formazione per i docenti?* Nuova Secondaria - n. 5, gennaio 2021 - Anno XXXVIII, Studium, Brescia, pp.140-153.

re students[8].

3. M-Learning: definition and principles

Although there isn't a uniformity of M-Learning definitions, due to the fact that some of them are focused on mobile device typologies while others emphasize on the possibility to allow "omnipresent" learning; it is clear, however, that students and teachers mobility allows M-Learning more than specific tools or apps, what really allowed M-Learning is adequate mobility of users, contents and resources. Generally, there are various definitions of M-Learning that can be found in a literature review; they can fall, essentially, into one of the following four categories: 1) form a techno-centric point of view, i.e. M-Learning is correlated with mobile devices emphasizing technological aspects of the teaching-learning process[9]; 2) just an E-learning extension; 3) able to increase formal education and, therefore, able to overcome the vision that evaluates the latter as a set of stereotyped lessons: in this case, M-Learning could be complementary to each "classic" educational process; 4) centered on students, i.e. M-Learning can place at the centre new considerations of roles and meanings that students can have of their possibility to access new knowledge, every time and everywhere, changing their point of way about education, school, courses and lessons. In particular, the latter category leads to the definition M- Learning as any type of learning that occurs when a student is not in a fixed and determined place or what occurs when a student takes advantage form learning opportunities offered by mobile technologies[10]. Furthermore, another way of categorizing Mobile Learning has been proposed by the London Mobile Learning Group (www.londonmobilelearning.net) is called the M-Learning "ecological" approach. More in details, this group tries to empathize M-Learning by the use of an interdisciplinary approach, it ensures that each aspect of M-Learning teaching-learning process is considered, more in details: pedagogy, computer science, sociology, semiotic, and cultural studies led this group to settle a speculative framework for M- learning based on the notion of cultural ecology able to follow nowadays context that is in the continuous revolution that creates endless discontinuities in each learner or teacher. This approach emphasizes that it would be reductive to consider M-Learning only as a possibility of delivering content through mobile devices, because it should be considered as a process that leads the knowledge and how to face successfully new, and always changing, learning spaces. In this perspective, M-Learning is correlated with daily life abilities such as a learning virtual space.

4. A pedagogical approach to Mobile Learning

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[8] Todino, M.D., Di Tore, S., Scarinci, A. (2021). *Didattica a distanza e cyber attacchi: quale formazione per i docenti?* Nuova Secondaria - n. 5, gennaio 2021 - Anno XXXVIII, Studium, Brescia, pp.140-153.
[9] Winters, N., *What is mobile learning?* In M. Sharples (ed.), Big issues in *Mobile Learning*, University of Nottingham, 2006, pp.5-9. https://telearn.archives-ouvertes.fr/hal-00190254/document (ver. 23.04.2021).
[10] Mobilearn. Guidelines for learning in a mobile environment defined. https://hal.archives-ouvertes.fr/hal-00696244/document (ver. 02.12.2020).

While mobile technologies used in learning environments has been often analyzed researches[11], the results of pedagogical investigation still remain, sometimes, in the field of wishes and proposals, although their potential in facilitating growth processes, in development of identity, in orientation towards values and also visions of the world setting are well known. Besides, form a pedagogical perspective, M-Learning, moving from a technocentric vision, have anticipated their social vision, or better, a social practice that technology allows it to be possible, in which the same concept of mobility shows different shades of meaning[12], thus, assuming that mobility must not be understood only as "human" movement through places, it could include more aspects such as spatiality, temporality and contexts where teaching-learning process take place. These elements, all together, show an idea of mobility originates by the interaction between people and mobile devices, besides they make these interactions more dynamic and achievable without spatial, temporal and contextual limits: in this way, teaching-learning process start to be very natural, consequently, this method to access learning resources make possible new forms of knowledge representation[13] in line with the notion of cultural ecology. Additionally, Key competences and basic skills defined by European Commission in its approach of the European Recommendation about learning knowledge, learning skills, learning to learn, learning "to live" and so on, can be also seen as the institutionalization of curricular knowledge that it could receive important support from mobile devices; besides, learning skills can be directly linked by using mobile devices and their playful use to improve classic cultural techniques; moreover, a "mobile" way to learning can mean an extension of cognitive and affective flexibility or a new evaluation of social "ties" and relationships; finally, learning to learn can refer to moments of self-reflection and self-control in each relationship. Looking at mobile technologies as a new pedagogical methodology, or in some case as new support for other methodologies, is absolutely necessary because, in today's world, nobody can ignore their increasingly massive presence, in order to reach an objective of educational research should be to identify teaching methods that enhance traditional supports, such as the book, including all tools that fall within the field of trans-media. An always-on connection, a possibility of creating social communication networks using, for example, instant messaging or joining groups allows an increasingly widespread virtual, informal socialization that creates new forms of communication that pedagogy cannot ignore: a new need to explore and M-Learning in order to build a bridge between formal, non-formal and informal learning.

5. Mobile devices and teaching-learning process and Bloom taxonomy

From previous paragraphs, start to be clear that it is important a deep study on mobile technologies in learning environments that could open new scenarios where pedagogy and didactic should interpret, i.e. entire training processes should be reworked, passing from a traditional vision, in which it is intended as a moment of meeting, delim-

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[11] Hug, T., *Mobile learning as' microlearning': Conceptual considerations towards enhancements of didactic thinking*. International Journal of Mobile and Blended Learning, 2(4), 2012, pp-47-57.
[12] Kukulska-Hulme, A., Sharples, M., Milrad, M., Arnedillo-Sánchez, I. & Vavoula, G., *Innovazione nel mobile learning. TD Tecnologie Didattiche*, 2, 2008, pp.4-21.
[13] Ivi, pp.10-11.

ited both in time and space, between a teacher and students, and a new contents in which it is considered as a huge number of continuous and unstoppable processes, not forced to pre-established meetings and physically predetermined. With mobile technologies, then, it is possible to provide students with a possibility to have big access to information even when they are not in their classroom, in their laboratory or in front of their computer. There are actually three ways in which learning can be considered mobile[14]: 1) about space, for example at work, at home, or in places of leisure; 2) about different areas of life, for example, it can refer to job-time, it can improve knowledge, or simply be considered in a moment of leisure; 3) about time because it can be used at different times of the day. These characteristics add new pedagogical scopes to learning-teaching process; besides mobile devices, that are transportability and personalization, generate interaction between students and each type of educational context because knowledge could be seen as information in a context and they could fit support learning process and many knowledge building. In this regard, it is possible to identify five properties of mobile devices that could be clearly relate to didactic methodologies: 1) portability, i.e. a device can be safely and easily transported from one place to another, for example from a class to another or from one building to another[15]; 2) social interaction, that allows a development of knowledge through a sharing mechanism in between educational space, lessons, also face to face, for example it could be done exchanging teaching materials using a smartphone; 3) sensitivity to each context, which underlines any ability of wireless devices to collect and compare real (or simulated) data of particular case and context about change of space, environment or time; 4) connectivity, when it is defined as possibility of creating a networks between both mobile and fixed devices; 5) individuality, i.e. as a possibility of creating personalized and customized courses for any student, which could be also be followed outside formal context. As far as achievement of courses purposes, mobile devices could be compared, just as an example, Bloom taxonomy provides six teaching levels a full framework for classifying educational aims in six different levels: knowledge, understanding, application, analysis, synthesis, evaluation[16]. In particular, it is possible to underline that with mobile technology it is possible to improve learning experience connected them with different levels of taxonomy that could be optimally modulated; if, for example, an audio recording is taken into consideration, it is possible to elaborate different purposes of the same audio on the basis of the degree of taxonomy being considered. Besides, Bloom with his researchers decides to make a revision of his taxonomy to really face all-new dimensions of schools[17] also thinks about technologies. Specifically, for low levels of the taxonomy (knowledge and understanding) where the objectives are defined by verbs such as "list", "memorize", "identify" or, in the following phase, to "summarize", "discuss", "explain", the resources that can be used with mobile

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[14] See Bianco, C., Coccoli, M., & Vercelli, G., *Mobile Learning per servizi orientati alla formazione*. In A. Andronico & L. Colazzo (eds.), *Didamatica 2009*, Editrice Università degli Studi di Trento, Trento, 2009.

[15] See Klopfer, E., Squire K., & Jenkins, H., *Environmental Detectives: PDAs as a Window into a Virtual Simulated World. Proceedings. IEEE International Workshop on Wireless and Mobile Technologies in Education*, Tokushima, 2002, 95-98, doi: 10.1109/WMTE.2002.1039227 (ver. 23.04.2021).

[16] See Bloom, B.,S., Krathwohl, D.,R., & Masia, B.,B., *Bloom taxonomy of educational objectives*. Pearson Education, Harlow, 1884.

[17] See Anderson, L.,W., & Bloom, B.,S., *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*, Longman, Harlow, 2001.

devices could be audio recordings that allow the learner to have an availability of basic materials such as audio instructions, recorded by teachers, in which there are suggestions and advice how collecting requested data; subsequently, a student should have a possibility to memorize this notes using an audio format or, on the contrary, a student could transform these indications collected them[18] by pencil and paper or in a Word file. In the other hand, for high levels of the Bloom taxonomy (synthesis and evaluation), in which it is required to be able to modify, build, plan, explore, judge or evaluate, M-Learning could be useful because, for example, elaborating an audio clip in which students must summarize a series of arguments for, or against, a specific question. The connection of mobile devices with Bloom's taxonomy also shows how it is possible to pass from one level to another easily because the improvement process is almost triggered[19], more in detail students that work with low levels of technologies are strongly motivated to reach an higher-level tasks with more technologies. Finally, the relationship between M-Learning and Bloom's Taxonomy could be totally clear if the next step of this research will highlight that for each Bloom's categories mobile apps could help both students and teachers to better reach each level with more autonomy and follow also another way to see Bloom's taxonomy that it could be extended to be suitable not only for school but also wherever it is significant to design new technologies[20].

6. As a liquid society and social media society influence M-Learning

In the last years, social media concept has now become part of everyone's knowledge because people link it with Internet and most popular applications such as Facebook and Twitter, or just because they are told about them, or reading about them on newspapers or watch television. Then, social media, in term of pervasiveness degree, and their possible implications on educational development of its users, it seems useful to try to extrapolate principles and philosophy underlying these social media, to be able to appropriately define these web applications and world spread communication platforms to understand their educational value based on an open and sharable digital content that is produced, criticized and re-configured by a big "mass" of users[21]. Through these tools, users can access to a series of activities such as chats, to interact with others, besides users can to many actions: create, edit and share textual, visual and sound contents but also categorize and recommend existing media objects: it is for this reason that the key features of social media are represented by socialization and mass participation. Social media would capture users' attention but also experts of educational technologies who considered Social media comparable to a learning environment, from a constructivist point of view, above all because they were considered active, manipulative, collabora-

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[18] Pieri, M., *L'accessibilità del Mobile Learning*. TD-Tecnologie Didattiche, 52, 2011, pp.49-56.
[19] See Anderson, L.,W., & Bloom, B.,S., *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*, Longman, Harlow, 2001.
[20] Azuma, M., Coallier, F., & Garbajosa, J., *How to apply the Bloom taxonomy to software engineering*. In *Eleventh annual international workshop on software technology and engineering practice*, Amsterdam: IEEE. doi: 10.1109/STEP.2003.13, 2003, pp. 117-122.
[21] Selwyn, N., I Social Media nell'educazione formale e informale tra potenzialità e realtà. TD Tecnologie Didattiche, 20 (1), 2012, pp.4-10.

tive, conversational, complex and reflective: all qualities considered intrinsically educational. In particular, they support the multi-modal nature of intelligence now attributed to inquiry-based learning. A research[22] showed that there are some educational properties in social networks: in a survey conducted in Cyprus, aimed at evaluating teachers' opinions on the effectiveness of a school learning environment shaped with Facebook, there were positive opinions, that there were reported from teachers involved, who believe that social network application used has improved students' ability to work in a group, and Facebook has also allowed an increase in their participation and motivation levels; at the same time, in Korea and Israel contribution of social networks, to communication between teachers and students, was assessed, and it generates a greater variety of educational situations improving communication between students and teachers to better face learning-teaching process. Generally, to see also negative aspects, main criticisms raised against the use of social networks in training environments concern: 1) technological unpreparedness that affects both teaching, school staff and students, due to erosion of traditional roles of educators and students[23]; 2) privacy and online security management; 3) a distracting power related to of social media; 4) overload of information; 5) and last but not least, cyber-bullying. About this last point, The Italian Ministry of Education, Universities and Research[24] "stressed" that a specific teachers' training is required because they should be able to provide a preparation that allows them to strengthen the ethical and social value of new digital tools in relation to their threats, to develop new skills necessary to promptly identify any psychological consequences resulting from a distorted use new technologies and violence in face-to-face contexts. Teachers can become as "antennas capable of picking up anomalous signals" and must be put in a position to be able to exercise their reference and listening also through the correct use of social networks, both inside and outside school. These ethical and social values of digital social networks, in relation to their threats, should be as compensation of this age of liquid society[25]. The polish sociologist defined liquid life as a kind of life commonly lived in our contemporary, that "it cannot stay on course, as a liquid-modern society cannot keep its shape for long" and more in detail, it "is a precarious life, lived under conditions of constant uncertainty". Thus, cyber-bullying could be a precursor of difficulties that a teenager will face in adulthood solitude, in which others also approach to hurt each other's, not only verbally (for example sexting), and then disappear in digital social network liquidity. Staring from this considerations, and according to the principles of Media Education. Some "countermeasures", that teachers should be applied, are mainly three: 1) affective: the teacher's goal will be to stimulate a reflection on new media role and how it plays in students' life, they should try to highlight internal needs and how these media

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[22] Grion, V., & Bianco, S., *Social network come strumenti didattici: percezioni e atteggiamenti di insegnanti e studenti. TD Tecnologie Didattiche*, 24(3), 2012, pp.136-146.

[23] Manca, S., & Ranieri, M., *I social network nell'apprendimento*. In D. Persico & V. Midoro (eds.), *Pedagogia nell'era digitale*. Edizioni Menabò, Ortona, 2013, pp. 24-29.

[24] See MIUR. Ministero dell'Istruzione, dell'Università e della Ricerca, *Linee di orientamento per la prevenzione e il contrasto al bullismo e al cyber bullismo*, 2017. https://www.miur.gov.it/documents/20182/0/Linee+Guida+Bullismo+-+2017.pdf/4df7c320-e98f-4417-9c31-9100fd63e2be?version=1.0 (ver. 02.12.2020).

[25] See Bauman, Z., *Vita liquida. Sulla fragilità dei legami affettivi*, Laterza, Bari, 2006.

influence these students' existence; 2) technical: a teacher will try to educate to a mutual literacy process, where both students and teachers will familiarize themselves new digital tools and their functionalities; 3) civic: a teacher will undertake to stimulate a reflection in each child on others' behavior on Internet, in order to find a way to translate students' needs into digital rights as defined in EU Council Recommendation of 22 May 2018 on key competences for lifelong learning.

7. E-learning and AI's cyber security in ICT global market

European Recommendation of 22 May 2018 on key competences for lifelong learning of Council of European Community [26], highlights (at point 6) that: "high quality education, including extra-curricular activities and a broad approach to competence development, improves achievement levels in basic skills. In addition, new ways of learning need to be explored for a society that is becoming increasingly mobile and digital". For this reason, European education strongly bounds with ICT since that date. Thus it is important, for educational research, to study M-Learning and E-Learning market[27] to better understand future strengths, weaknesses, opportunities, and threats of them. Nowadays, E-Learning Market, have a forecast Compound Annual Growth Rate of 8%, form 172 Billion of Euro in 2019 to a 323 Billion of Euro in 2026, as forecast in E-Learning Market Trends 2020-2026, thus there will be easy to believe that M-Learning will be one of the main actors of the 21st-century educational field.

E-Learning Market Report Coverage			
Report	Details		
Base Year:	2019	Market Size in 2019:	172 Billion of €
Forecast Period 2020 to 2026	8% (Compound Annual Growth Rate)	2026 Value Projection:	323 Billion of €

Figure 1: E-Learning Market Report Coverage. Source: Adaptation from E-Learning Market Trends 2020-2026 Global Research Report, published by Global Market Insights Inc., May 2020.

In Europe M-Learning growth drivers should be principally three: 1) an increasing demand from the healthcare sector; 2) a rise in content digitization; 3) switching to cloud-based systems. While, in Africa, such as in the Asia Pacific, the Middle East and Latin America should be five: 1) growth in higher education sectors; 2) corporates upgrading their training programs; 3) growing demand for online English courses; 4) rise in government programs and initiatives; 5) rising penetration of internet and mobile learning, as it will show in the next paragraph for Sub-Saharan Africa. Teachers' Education will be one of the main goals to create a good quality M-Learning; nevertheless, it is possible to explain to each teacher how to activate a safe class, how to contain cyber-attacks and how to protect their work and their students. Moreover, it should be

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[26] See Raccomandazione 2018/C 189/01 del Consiglio Europeo, 22 maggio 2018. *Relative alle competenze chiave per l'apprendimento permanente.* https://eur-lex.europa.eu/legal-content/IT/TXT/PDF/?uri=CELEX:32018H0604(01) (ver. 02.12.2020).
[27] See Wadhwani, P. & Gankar, S., *E-Learning Market Trends 2020-2026*. Global Research Report. 2020, https://www.gminsights.com/industry-analysis/elearning-market-size (ver. 23.04.2021).

remembered that there is an ongoing dispute over the sharing of the market of M-Learning platforms, a business worth billions of euros, by ICT companies thus cyber-attack should be increase on teachers and scholars, more in details it is possible that new flaws will be opened on the data security of users and the confidentiality of video lessons. In the Zoom Bombings or Zoom Raids case, The University Health Services Tang Center of Berkeley University report to its community that a "Zoom Intrusions are when individuals infiltrate meetings and share hate speech, offensive images, and/or use offensive usernames that are intended to disrupt, upset, and in many instances spread fear. Students who witness these harmful intrusions can be left feeling highly distressed and, in some cases, emotionally traumatized"[28]. A Zoom Raids is easy to avoid because it is possible to generate a Zoom link password-protected for a virtual classroom but news programs often do not say this to generate panic. Often, media highlight problem but they don't educate also to an easy security solution, for this reason, it is important to promote teachers' training about M-Learning, E-learning and ICT security. Anyway, coming back to Zoom Bombings, after a few months, to highlight the security of this video conference platform is high, it is to believe that this company, to change users opinion about its services and to stem market loss from other IT companies, organized with special testimonials for an advertising campaign: the British Royal Family[29], more in detail, the Queen of the United Kingdom used it to participate to a series of online events in June and July 2020, from her Windsor Castle. This advertises and endorse was helpful for Zoom which is regularly listed on the NASDAQ, restoring confidence to all users who were abandoning Zoom in favour of other platforms (https://www.businessofapps. com/data/zoom-statistics/). More in details, it passed from a four-month period one of 2020 net revenue € 0.17 million to € 4,75 million, due to looking down and an increase of smart work and distance education, falling to € 1,90 million, due to Zoom Bombings phenomena, to a four-month period forecast net revenue €13,2 million due to endorsement, advertising and user's platform training. Why talk so long about E-learning's global market? Because it concerns to school's world, in fact, before look down, computer science was, in many cases, outside school system but now it is inside it for each student and each teacher, due to online lessons, thus it was no more possible to do not analysis how this market role will use to improve the number of users, as well as in the past ICT companies find a way to change the workplace. This paragraph, it could be red such as a Media Education introduction to problems that arise when ICT companies trying to improve their global market shares, generate a negative effect of distance education. More in deep, Cyber-attacks endure to distress Education platforms with a very high

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[28] See University Health Services Tang Center Berkeley University (UHS). Zoom Intrusion Incidents How to Respond Both Physically and Emotionally. https://uhs.berkeley.edu/sites/default/files/zoomintrusions.pdf (ver. 23.04.2021)

[29] See Mitchell, A., *Queen Elizabeth II joins the rest of the world on a video call for her first public outing online.* MarketWorld.com (June 15th, 2020). Blog.https://www.marketwatch.com/story/queen-elizabeth-ii-joins-the-rest-of-the-world-on-zoom-in-her-first-online-public-outing-showing-support-for-uks-covid-carers-2020-06-11(ver. 23.04.2021).

rate[30] but, fortunately, Artificial Intelligence algorithms[31] are ready to be introduced as embedded tools in Distance Education Apps and Education Suites, for example, GSuite For Education already have these feature. Why is it important to improve Artificial Intelligence in these distance education web applications? First, because it is possible to shape a clever cyber security based on machine learning and deep learning system and forecast security threats using AI and design smart systems that can perceive uncommon and suspicious situations or attacks and neutralize suspicious network activities; second, because Artificial Intelligence could really help not expert users, both teachers and students, from phishing and similar issues. Auspiciously, in the close future, more and more ICT systems based on neural networks will introduce these features in educational platforms, that will allow automatic analysis of URLs, insides messages, chats and so on, to reduce malicious links risks injected by malicious automatic systems. In this way, not only expert system administrators, or computer scientists, will be able to face these malicious links, but also all users will be able to identify them through Artificial Intelligence algorithms that will do this analysis for these users. For these reasons, Educational institutions should really take into account these issues because "malicious URLs are one of the primary mechanisms to perpetrate cybercrimes"; this is a critical point when platforms involving children and adolescents, i.e. platform must be perfectly safe: no digital backdoors should be open to illegal actions, and machine learning could really give benefits starting from automatic URLs analysis of dangerous links. Moreover, malicious links could "host unsolicited content and attack unsuspecting users, making them victims of various types of scams (theft of money, identity theft, malware installation, etc.). This has resulted in billions of dollars' worth of losses every year", for these reasons Educational institutions should decide to use platforms that embedded malicious links detectors, with Artificial Intelligence technologies, to save money and, last but not least, Educational institutions systems administrators, teachers and students time to clear machines (pc, smartphone, tablets, etc.) from virus and similar malware especially when, as in this period of SARS-CoV-2 health emergency, distance learning requires PCs that are always connected and not corrupted or with malfunctions.

8. M-Learning in Sub-Saharan higher education

The topic M-learning and outdoor teaching, both not formal and informal teaching, is a plausible reality across the southern country and it would be wise to be aware of the primordial place that the need for a change in educational paradigm in these countries, especially in certain countries of Sub-Saharan Africa. To do this, Mobile phones, Smartphones, PC and tablets can solve the problem. African students need a stimulus that facilitates access to educational resources at any time and place. The digital revolution seems to be very much in this region. Statistics show that Sub-Saharan Africa will remain the fastest-growing region of smartphone users, with a CAGR of 4.6% and an

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[30] See Parisi, A., *Hands-On Artificial Intelligence for Cybersecurity: Implement smart AI systems for preventing cyber attacks and detecting threats and network anomalies*, Packt Publishing, Birmingham, 2019.
[31] See Kaplan, J., & Di Salvo, P., *Intelligenza artificiale: guida al futuro prossimo*, Luiss University Press, Roma, 2017.

additional 167 million mobile subscribers by 2025. This will bring the total number of subscribers to just over 600 million, or about half the population. By 2025, the number of Smartphone connections will be more than double: the biggest growth will be recorded by the East African Community (EAC), with Rwanda and Tanzania at the top. The world population increased sharply in the 20th century. The world demographic growth is carried by the Asian continent and to a lesser extent by the African continent. Projections are that in the coming decades, population growth will continue in Asia and eventually slow down. It will be very strong in Africa. The demographic growth of American and European countries remains stable, even decreases slightly. Knowing that the majority of this African population is young and aspires to a good education, no one can ignore the dismal state with which African students in general and Congolese in particular, are crowded in the audience to follow the course. Current academic institutions will be able to accommodate this growing number of young students in the years to come. This will significantly help the quality of the education transmitted. And yet, with M-Learning, the managerial body of each institution, in concert with the governments of the respective countries will be able to contain this difficulty exploiting the advantages that this new information and communication technology could bring about educational contexts[32].
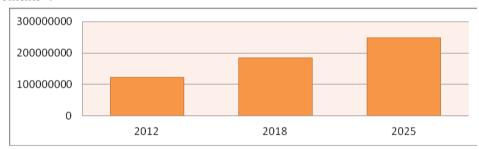

Figure 2: Forecast of mobile users in Sub-Saharan Africa, the number of users. Source: adaptation from The Mobile Economy of Sub-Saharan Africa, GSM Association (2019)
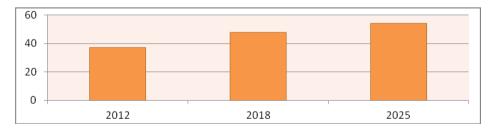

Figure 3: Forecast of mobile users in Sub-Saharan Africa, the percentage of the total population. Source: adaptation from The Mobile Economy of Sub-Saharan Africa, GSM Association (2019)

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[32] See Rivoltella, P.,C., & Rossi, P.,G., *Il corpo e la macchina. Tecnologia, cultura, educazione.* Morcelliana, Brescia, 2020.

The governments of the countries of the south know that distance education is the facilitating tool par excellence, promoting access to education and ensuring social balance by providing educational content relating to each institution, however, control by a central government via a ministerial entity pertaining to it, in accordance with the requirements relating to national governance relevant to each country and economic operators are called upon to find a consensus in order to facilitate communication between learners and academic or university institutions in the introductory framework of M-learning. In the ISTA, an Applied Technics Institute context, with a Visiting Professor exchange with Italian researchers and adjunct professors, we improved this approach using Skype and Edmodo. Besides, the possibility of using mobile devices in educational environments has been at the centre of the debate that has interested the scientific community for several years, ever since it was realised that contemporary society has undergone considerable changes, coinciding with the spread of technological tools. PCs, tablets, smartphones, have become part of every individual's life in a pervasive way, becoming indispensable and, in some ways, conditioning. For this reason, the school could not ignore the spread of the phenomenon and for some time now has been questioning the role of new technologies in the school context. Mobile Learning appears, among the various opportunities offered by Media Education, to be the most responsive to the learning characteristics of the so-called "digital natives" generation, always connected through their mobile devices. Experts talk about a methodology useful to create involvement, participation and sharing in students who seem much more interested in this approach because it is close to their communication and knowledge acquisition methods. The possibility of using mobile devices in educational environments has been at the centre of the debate that has interested the scientific community for several years, ever since it was realized that contemporary society has undergone considerable changes, coinciding with the spread of technological tools. PCs, tablets, smartphones, have become part of every individual's life in a pervasive way, becoming indispensable and, in some ways, conditioning.
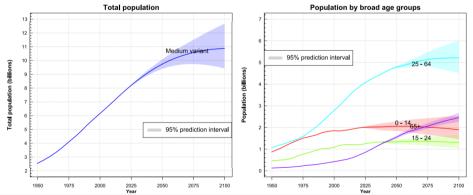

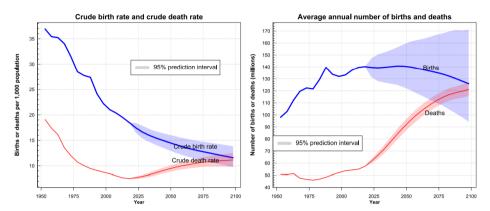**Figure 4: ONU's Profile excerpt from the World Population Prospects 2019,**

Figure 5: ONU's Profile excerpt from the World Population Prospects 2019, about crude births and crude deaths. Source: ONU open data.

For this reason, the school could not ignore the spread of the phenomenon and for some time now has been questioning the role of new technologies in the school context. Mobile Learning appears, among the various opportunities offered by Media Education, to be the most responsive to the learning characteristics of the so-called "digital natives" generation, always connected through their mobile devices. Experts talk about a methodology useful to create involvement, participation and sharing in students who seem much more interested in this approach because it is close to their communication and knowledge acquisition methods. Furthermore, in Kinshasa, not only ISTA but also The UCC (Université Catholique du Congo) is starting to use M-Learning.

9. Conclusion

Starting from these considerations, it is possible to support that M-Learning appears as one of the main teaching technologies for the future. Our country seems to be going a little slow, about mobile 5G network to provide broadband connection everywhere, due to chronic problems related to the lack of funds, poor "innovative" planning, etc. In addition, there are some critical issues related to teachers' digital skills. This last issue, probably, concerns with a lack of updating in teachers' digital training courses, thus they are not being prepared to face these new challenges, besides they consider themselves simply from a negative point of view: on the other hand, as the European institutions have repeatedly requested[33], it is necessary that the whole world of school is renewed both from a structural and a content point of view, and this, for Italy, represents a still considerable problem. More in details, in this work it was explored more than this Italian school situation, it was showed some relations that M-Learning has with Bloom taxonomy, liquid society and Sub-Saharan higher education and it is possible to hope that in the future, as described in paragraph 7, M-Learning will really support all students

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[33] See Raccomandazione 2018/C 189/01 del Consiglio Europeo, 22 maggio 2018. *Relative alle competenze chiave per l'apprendimento permanente.* https://eur-lex.europa.eu/legal-content/IT/TXT/PDF/?uri=CELEX:32018H0604(01) (ver. 02.12.2020).

and all teachers to improve their teaching-learning processes. Above and beyond, as shown in paragraph 6, Artificial Intelligence could really support teachers and students, from avoiding phishing and similar troubles if Educational institutions will adopt platforms that embedded malicious links detectors, in this way, these institutions, could save money and eluded virus and similar malware unintentional installation in their users' devices allowing a better operating mode of distance learning. To compose a complete "portrait" of this research, it is important to clarify those main goals were three: 1) starting a collaboration between Italian and Sub-Saharan Universities to find common opportunity to research and invest together for a better quality of education using 5G Network, IoT, AI and over all M-learning; 2) detecting correspondence and the difference between Europe and RD-Congo higher education; 3) thinking together about new ad hoc teachers training starting from Italian know-how about education and ICT Congolese know-how – ISTA in Kinshasa is basically an institute of technology – join with Italian one on educational technologies. In the spring semester 2020-21, there will decide together many aspects of next steps, first design together possible solutions and second define possible variances between teachers training in schools and universities.

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