

How to Cook a Duck: The Importance of M-Learning

An Operational Practice prepared for SCTE by

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Table of Contents

Title	Page Number
1. Introduction.....	4
2. Context.....	4
2.1. The Arrival of Industry 4.0	4
2.1.1. Labor Market Impact	5
2.1.2. New Ways of Learning	5
2.2. Telecom in this market.....	5
2.3. Customer Centrality	6
2.3.1. Importance of Customer Loyalty	6
2.3.2. NPS as a Loyalty Indicator.....	7
2.4. OKR Based Learning	7
3. Theoretical Framework	8
3.1. ICT Tools in the Educational Process	8
3.2. Mobile-Learning as part of Blended-Learning.....	9
3.3. The appearance of WhatsApp	9
3.4. Relationship between WhatsApp and M- learning	10
4. Study proposal	10
4.1. Justification.....	11
4.2. Hypothesis.....	11
4.3. Goals	11
4.4. Scope	11
4.5. Investigation methodology	12
4.6. Investigation	12
4.6.1. Demographic analysis of the sample	12
4.6.2. Survey on learning modalities.....	13
4.6.3. Launch of the m- learning initiative	15
4.6.4. Case 1: e-DOC - Substitution of Paper by Digital Systems.....	15
4.6.5. Case 2: Recovery of Power Supplies from CPEs.....	17
4.6.6. Case 3: Good FTTH Practices.....	18
5. Conclusion.....	20
6. Future steps	20
Abbreviations	21
Bibliography	22

List of Figures

Title	Page Number
Figure 1: Percentages of staffing according to generation of belonging.	13
Figure 2: Percentage of type of learning device used by generation	13
Figure 3: Percentage of Learning modality used in the last year according to the response of field technicians	14
Figure 4: Learning modality recognized as valid by technicians.....	14
Figure 5: e-DOC. Communication board by WhatsApp.....	16
Figure 6: Impact of communication on the weekly evolution of adoption of the e-DOC App	16
Figure 7: Impact of communication on the monthly evolution of adoption of the e-DOC App.....	17
Figure 8: Recovery of power supplies. Communication board by WhatsApp.....	17

Figure 9: Impact of communication on the monthly evolution of the recovery of CPEs power supplies. ... 18
Figure 10: Good connectorization practices. Communication board by WhatsApp 19
Figure 11: Impact of communication on the bimonthly evolution of the failure rate of fiber connectors..... 19

1. Introduction

Mobile technology has transformed many aspects of our lives, including the way we learn and perform everyday tasks. An example of this statement occurs in daily life in the cooking process: in this case due to the need to prepare a duck. Through mobile devices, we have access to a wide range of educational resources that not only teach us how to cook but also improve our culinary skills and transform the kitchen experience.

Mobile learning allows us to access online cooking tutorials, detailed recipes, how-to videos, apps and interactive websites to become indispensable companions providing instant access to tips and tricks while preparing ingredients. They also offer commentary spaces for other amateur cooks, creating a collaborative learning environment.

Thus, from preparing a simple duck to creating gourmet dishes, the availability of educational resources through mobile devices has redefined the way we approach cooking and gives us the opportunity to be continuous learners in this culinary art.

Similarly, m-learning (mobile learning) has a significant impact on the work of a field technician, who are constantly on the move, performing maintenance, repair, and installation tasks at different locations.

Access to real-time information allows technicians to access manuals, repair guides, video tutorials and other resources directly on their mobile devices while on the job site, thus solving problems on the spot, avoiding delays and improving efficiency.

In complex or unfamiliar situations, technicians can search for solutions online, consult discussion forums, and access practical communities that can offer guidance and advice.

Instant communication is another very useful tool. Key to reinforce concepts in the deployment of new technology and services, provide the solution to unforeseen situations that require rapid and massive action, help as a reminder of new work processes, and all other information of a massive nature that requires rapid or planned dissemination

Lastly and very importantly, it keeps continuous training alive by offering updates with the latest technologies and procedures through online courses, webinars and specific training materials.

In short, mobile learning on the job offers a field technician an efficient and effective way to access information, improve skills, and communicate effectively, all while on the go to get the job done. This combination of technology and continuous learning can improve the quality of work and the satisfaction of both technicians and their customers.

In this paper we will cover all the actions carried on Telecom Argentina with this purpose, that include include the deployment of different tools and the creation of different contents/activities with the support of different frameworks and studies.

2. Context

2.1. The Arrival of Industry 4.0

The arrival of the fourth industrial revolution or Industry 4.0 brought technologies focused on intelligent environments, that is, processes and things with a certain autonomy. This trend is reflected in the

automation, digitization and massive use of information from each component of that universe. IOT, Big Data, Cloud Computing, Cybersecurity are the new paradigms (Baygin, Yetis, Karakose, Akin , 2016).

Undoubtedly this impacts society, industries, organizations, business, culture and education. The new professions and workers need, in addition to incorporating new disciplines and practices, they must have a broader and more global vision, in a digital learning environment (Cortés, Landeta, Chacón, 2017).

The use of ICT (Information and Communication Technology) tools will be key in the management of information and communication. Billions of different digital devices access Internet-based networks, as key drivers in cost reduction and customer compliance (Joyanes, 2017).

2.1.1. Labor Market Impact

Digital transformation will demand a greater number of skilled workers. It is estimated that by 2030 this demand will considerably exceed supply, causing a scenario of global talent shortage to face the evolution of Industry 4.0 (Ferry, 2018).

Future organizations will need to attract and retain staff, while improving their skills and knowledge, within a framework of motivation and commitment.

This scenario requires companies to evolve taking advantage of technology and promoting the autonomy of people, generating collective knowledge through learning ecosystems that promote a culture of constant, social and collaborative development, as well as experiential.

New workers require experience in multidisciplinary teamwork and communication skills, not only with other humans but also with machines. They must be prepared to learn new things and with the conviction of being the best prepared for the changes that are coming (Kozák, Ruzicky, 2018)

2.1.2. New Ways of Learning

The new learning ecosystems must focus on people and not on disciplines, giving importance to autonomous learning and the practice of "learning to learn", highlighting the ubiquity of learning, at any time and place, according to the needs of the people, and with special importance of innovation and methodological variety, to make it more adaptable to the requirements of each individual and group.

"Knowledge" is valuable, and it must flow in the organization, which is why new learning modalities are necessary beyond 70-20-10, such as virtual learning, M- learning, collaboration or co-creation, adjusted to the new organizational environments marked by ubiquity (DESI, 2018)

The teaching model for these new skills must be adjusted to the learning styles of each one, their independence of time and location, individual needs and contents that represent permanent or lifelong learning. A problem-oriented model, in a way that is connected to a reality based on the resolution of a particular case.

A challenge that implies making mentality changes for both teaching and learning, (Kozák, Ruzicky, 2018)

2.2. Telecom in this market.

As far as the future is concerned, Telecom's focus is to continue consolidating itself as an ecosystem of digital solutions and platforms, leveraged on connectivity as its competitive advantage. The company's

compromise in expanding and boosting its fixed and mobile networks is unwavering, but with the goal of going beyond connectivity, accompanying the challenges of the digital economy and developing new business products and services related to IoT, fintech, cybersecurity, entertainment, and smart home, among others.

In this evolution from a telecommunications company to a Tech-Co with regional reach, the development of digital talent is key. The company's evolution comes with a cultural transformation among its collaborators, implementing agile and collaborative methodologies and developing cross-functional work practices focused on enhancing customer experience.

Telecom continues to drive the evolution of its industry and boosting the growth of the digital economy, generating value for its customers by incorporating the most innovative technologies in the market, such as the 5G standard, and expanding the regional footprint of its services (CNV, 2022).

2.3. Customer Centrality

The technological and digital revolution is modifying the ways of living, relating and working. This phenomenon is manifested not only in the speed at which the changes take place, but also in the global scope, depth and breadth of the transformations in the models of production and governance management of the global economic system. The telecommunications industry is at the center of this revolution, offering people the opportunity to easily connect, access information, and handle enormous amounts of data storage and processing (Camps, 2016).

Paradoxically, this digitization of economic activity and the appearance of new business models did not generate a significant increase in value for telecommunications companies. The appearance of new actors, called over the top (OTTs) and digital native companies got ahead and were able to identify and understand the new consumer demands and transform them into successful business models (Cullem, 2019).

Thus, telecommunications companies are forced to reinvent their relationship with the customer, migrating from the classic access-based management model to the customer-based model. To do this, they must strengthen the customer experience by incorporating service quality as a key element of differentiation, complementing the traditional SLA metrics (Theoretical vs Real Quality) with others that incorporate the measurement of perceived service as a variable for monitoring and managing the experience. of the client (Martinez Arroyo, 2018).

2.3.1. Importance of Customer Loyalty

The competitive context leads companies to multiple pricing, product and technology strategies, however, only those that focus on customer satisfaction achieve a sustainable differentiator to boost their profits and growth.

In turn, consumers have a variety of product, channel, and service options and are beginning to identify companies by the overall experience they receive rather than by one particular factor. This relationship is manifested through loyalty to the company. (Gasull, 2019).

This loyalty is a sales and growth enhancer, since those more loyal customers stay with the company longer and are willing to pay more for an experience that they value more. Additionally, they become promoters of the brand and promote the acquisition of new customers.

2.3.2. NPS as a Loyalty Indicator

The NPS (Net Promoter Score) is an indicator created by Frederick F. Reichheld, Bain & Company and Satmetrix to measure the level of customer loyalty to a brand or company, through its probability of recommendation. After asking customers how likely they would recommend a certain brand or company, they are categorized as promoters, passives, or detractors.

For this, organizations conduct customer surveys in order to obtain the necessary information. The main question posed by Reichheld (2003), asks the client to say in a range of 0 to 10 how willing he is to recommend the organization. Customers who respond between 0 and 6 are detractors of the company (dissatisfied customers who can generate a series of criticisms that would affect the growth of the company), those who respond between 7 and 8 are Neutral customers (customers who are satisfied, but are vulnerable to the activities of the competition or opinions of acquaintances), and those who give an answer within 9 and 10 are promoter clients and are in charge of recommending the organization and allowing it to have greater growth.

To calculate the NPS, the percentage of detractors must be subtracted from the percentage of promoters of the sample, as shown below:

$$NPS = \%Promoters - \%Detractors$$

The Net Promoter Score has become a key indicator of customer loyalty and used as a powerful competitive benchmark.

It stands out from this indicator that it is easy to obtain, favoring its adoption, that it is an easy-to-interpret metric, that it offers the possibility of easily benchmarking with companies and sectors, simply by sharing the NPS metrics of each organization and that it allows the approach to consumers and relate them to the indicator (Balan, 2012).

If we apply this perspective to the telecommunications industry, which has been converging in recent years through intense merger and acquisition activity and which, many times, makes them divert from the focus on the client, by monitoring the Net Promoter Score, these Companies could manage change more effectively, keeping their most valuable customers and attracting new ones (Deloitte, 2018).

2.4. OKR Based Learning

Learning based on OKR (Objectives and Key Results) has several advantages and benefits that can positively impact personal growth, professional development and organizational success.

The OKRs help align an organization towards the strategic objectives it wants to achieve. OKR goals should be qualitative and even inspirational, limited in time, and actionable (Paine, 2011).

A training plan based on OKR will help us clearly define the objectives of a training and the results that indicate that these objectives have been met.

In this way, the effectiveness of the training will be increased, the efficiency of the application of the courses in the Organization will be improved and, fundamentally, the speed of cultural change will be increased.

This focus on measurable results will help focus learning on tangible, measurable results, allowing people to visualize their progress and success. In addition, measurement and feedback provide a framework for

measuring progress and results. This facilitates the identification of areas for improvement and constant feedback to adjust the learning approach based on the results obtained (Wodtke, 2021).

An example of this might be a Primary Objective of Raising the technical quality of the work of field technicians to provide exceptional service to customers.

The key results are to evaluate technical skills, approval of certifications, efficiency in solving problems, customer satisfaction.

3. Theoretical Framework

3.1. ICT Tools in the Educational Process

In teaching practice, the importance of integrating information and communication technologies (ICT) in teaching-learning processes is established, particularly the incorporation of mobile devices, given that both globally and nationally their use has increased among people due to its portability, immediacy, connectivity and adaptability. These technologies have generated a paradigm shift in education in general and in distance education because they increase the possibilities of interacting with group members, improve communication and blur the barrier that separates students and teachers (Cantillo Valero, Roura Redondo and Sánchez Palacín, 2012).

The speed of technological advances and their global reach give rise to adaptive and proactive responses in organizations and individuals, based on the innovation-acceptance-consolidation-obsolescence flows, whose knowledge management strategies are not alien to them and have an impact by modifying Teaching and Learning processes (Illanas & Llorens, 2011).

This implies reconsidering alternatives that go beyond educational challenges since the solutions are both the cause and origin of new changes in the concept of knowledge management (Schlemmer, Saccol & Garrido, 2007).

On the other hand, the influences that the irruption of networks and social media produce in the daily habits of users, causes a greater demand for personalization of learning. The demand for absolute connectivity with other peers is increasing, unlimited access to resources and sources of information with total flexibility in the way, place and time of access.

An increasingly natural and necessary coexistence of formal and informal learning flows.

Thus, the educational ecosystem must provide students in the digital age with a series of skills that prepare them for a life in continuous technological evolution, among which it would be worth highlighting the skills to listen, search for various information in technological ecosystems, interact with other peers. constantly manage their digital identity and/or actively produce content, among others (Schlemmer, Saccol & Garrido, 2007).

Technology allows the e-learning system to bring the teacher's classroom closer to the student for their personal interaction, in an environment of flexibility and autonomy but that maintains the focus on the follow-up, guidance and monitoring of the learning process (Rosini 2013).

However, the introduction of new IT developments in education does not always translate into innovation (Oliveira, PC de, Cunha, CJC de A., & Nakayama, MK 2016) because their use is not a guarantee of a new form of education. This shows that the new pedagogical projects based on e-learning must be

designed differently than the traditional face-to-face ones, while the former seeks to strengthen the student-student relationship.

3.2. Mobile-Learning as part of Blended-Learning

Internet access from mobile technology allows personalized and localized learning beyond formal spaces (Pereira, Fillol and Moura, 2019). This learning is known as mobile learning. Given the great expansion of mobile technology, the best tools for learning are available to a large part of the population so that they can carry them in their pockets.

The essence of m- learning is "accessing information and knowledge anytime, anywhere, from devices that learners often take with them everywhere and find friendly and personal". (Gikas and Grant, 2013).

For this, it is necessary to digitally empower the apprentice to achieve the relevant skills for their learning. Without a doubt, more and more companies are betting on online training courses and that require their workers to take them.

Smartphones and Tablets are two of the products that have experienced the greatest expansion in recent years. These portable mobile devices have Internet access and a relatively high autonomy of use/charge, with the possibility of downloading numerous applications and that have functionalities of various kinds to carry out any task.

Adult learning adjusts skills and knowledge to fit the future of work, but its design needs serious rethinking (World Bank, 2019). Indeed, e-learning with the 70-20-10 model and the mobile learning emerge as an effective possibility to become the training channel.

Companies consider e-learning as a budgetary and productivity solution to business needs and changes in technology, which encourages them to take online training measures compared to more traditional solutions, which includes training through social networks and mobile devices, the inclusion of learning analytics and learning in the cloud. Companies, like other civil society organizations, undertake education projects beyond the educational system, in what is called non-formal education. This training process allows training throughout life and it is in this space that training in technology is being made possible as a transforming tool (Guzmán-Flores and García-Redondo, 2016).

3.3. The appearance of WhatsApp

WhatsApp is a free application and social network that is currently owned by Facebook that allows users to send messages, make calls and video calls through the Internet connection on their mobile device. It is compatible with Android, iPhone, Mac, Windows and Windows Phone and has multiple features that have made it a highly demanded platform (Clement, 2019).

Access from multiple devices such as mobile phones, tablets and computers, highlights greater flexibility in communication, with an intuitive and easy-to-use interface, for different types of users close to or far from technology (Wali, Winters, Oliver, 2016). It is currently used in more than 180 countries by over two billion people and is widely used in Latin America.

In 2023, WhatsApp became the preferred social network for Argentine Internet users, with close to 93% of Internet users interacting on the platform. Instagram and Facebook followed as the most popular social networks in Argentina, both with a participation of more than 85% of users (Statista, 2023).

Its irruption has to do with the wide benefits that its use brought. Starting with real-time and instant communication that facilitates fast and efficient interaction of different messaging formats (multimedia, text, images, videos, voice recordings, and documents), providing a richer form of interaction. This is free of charge through an internet connection from different geographical locations.

The possibility of creating broadcast groups facilitates contact with multiple people at the same time in a context of security and privacy since end-to-end encryption means that messages are protected and only the parties involved can read them.

It is these virtues that install WhatsApp in educational environments, as a complement to communication processes, collaborative learning and facilitating the transfer of knowledge through ICT to learn at any time and in any place (Suárez Ramírez, 2018),

Therefore, it is not only about using a mobile phone as an end, but about a means that the student (usually) already has to enhance their learning and that allows them to acquire knowledge and communicate with their peers and the teacher. (Khaddage, Muller, Flintoff, 2016))

3.4. Relationship between WhatsApp and M- learning

The relationship between m- learning and WhatsApp lies in how WhatsApp can be used as a tool in the context of mobile learning.

The first point of relationship is the communication and collaboration that both educators and students have on WhatsApp by sharing announcements, reading material, presentations or links to online learning resources, homework, and even providing assistance through text messages, images, and videos. Interaction that can occur in real time or asynchronously, helping participation and fostering collaborative learning.

Many times, the app acts as a massive and instantaneous channel of information that meets this need. In other cases, as a reinforcement of new concepts or others that need to be updated or kept current.

A widely used functionality of the app is the one that transforms it into a reminder of deadlines for tasks, exams or events related to learning as an organizational tool.

At the same time, it is also becoming a social- learning tool, in which students can collaborate on projects and teamwork through WhatsApp, sharing ideas, resources and progress updates (Younus & Qureshi, 2019).

In short, the intersection of e-learning and m- learning is messaging-based learning.

It is important to mention that although WhatsApp can be a useful tool in mobile learning, there are also privacy and security considerations that need to be addressed, especially when it comes to communication between educators and students. In addition, the effectiveness of using WhatsApp in an educational setting will depend on factors such as group dynamics, the culture of use of the platform, and the preferences of the participants (Ally, Prieto-Blázquez, 2014).

4. Study proposal

In previous points, WhatsApp is highlighted as a key tool of m-learning within the framework of a Blended ecosystem learning.

This argument is supported by the massive use of mobile devices and the messaging app, real-time communication between educators and students enriched by content in multiple formats, personalized and independent of time and place.

In a context of high dynamism and change, WhatsApp is presented as an agile communication channel and personalized information, easy to use and read, and crossing the barriers of time and distance for learning. WhatsApp as a key m-learning tool within a blended learning ecosystem will be explained through the demographic analysis of the field technical staff.

This work will seek to demonstrate through real use cases the improvement in operational and service indicators from mass communications to the field technical staff by WhatsApp.

To do so, we pose the following questions:

- Are operational and service indicators impacted by the use of WhatsApp as a communication tool during technical training of field employees?

4.1. Justification

The study is framed in a VUCA (Volatile, Uncertain, Complex and Ambiguous) context in which the need to adapt to the changing and challenging circumstances that characterize said environment appears.

Thus, the learning model through WhatsApp is offered as an effective strategy to address learning challenges in a VUCA environment, providing flexibility, access to information and effective communication. At the same time, it becomes a continuous training tool that adapts to different learning styles and facilitates quick decision-making.

4.2. Hypothesis

The use of WhatsApp as a training tool for the field technician improves operational technical indicators. Through reports in pre and post learning instances it is possible to demonstrate this correlation.

4.3. Goals

Demonstrate improvement in operational and service indicators through training initiatives via WhatsApp.

Formulate a rapid deployment model for the real-time management of these metrics that allow configuring a learning ecosystem for continuous improvement.

Reflect on the implications and feasibility of applying this work in other organizations and what conditions should exist in them for its implementation.

4.4. Scope

The study reaches the field technical staff within the framework of the learning ecosystem that trains them with the necessary knowledge to carry out their task.

4.5. Investigation methodology

A mixed qualitative -quantitative approach will be applied. Quantitative because it will be oriented to the identification of the communications that had an impact on certain operating parameters. Qualitative because it will use data collection and analysis to answer the research questions without following a rigid and sequential process within a context in which the metrics analyzed are affected by other variables not included in this research.

The research method will be Explanatory since it will be oriented to give an answer on how the training cause impacts on technical indicators, explaining how and under what conditions it occurs, and Correlational because in the study of these cause-effect relationships it will not maintain rigorous control of all variables.

It is non-experimental because it is a study that will be carried out without the deliberate manipulation of variables and in which the phenomena are only observed in their natural environment and later analyzed. Finally, it will be transversal since its purpose is to collect data at a single moment, whose purpose will be to describe variables and analyze their incidence and interrelationship at a given moment.

4.6. Investigation

4.6.1. Demographic analysis of the sample

The relationship between generations and the use of technology is a complex topic that reflects how different groups of people interact, adopt and adapt to technological tools based on their experiences and historical contexts.

The study mapped the field technical staff according to the well-known classification in Baby Boomers, Generation X, Millennials and Generation Z, validating that there are different approaches and diverse attitudes towards online learning (e-learning) due to their experiences and levels. of familiarity with technology (Chitiyo, Nyemba, 2023)

Baby Boomer Generation (born between 1946 and 1964): grew up in a pre-digital age, however, those who use technology adapt to e-learning if they receive the right support, more structured formats and more traditional learning approaches, such as webinars or online courses with a clear structure.

Generation X (born between 1965 and 1980): They are more familiar with technology than baby boomers and are prone to adopting the digital model of learning. They appreciate the flexibility of online learning and interactive formats.

Generation Y or Millennials (born between 1981 and 1996): they are digital natives and have a high affinity for e-learning. They value accessibility, interactivity and personalization in their learning experiences and tend to prefer more visual and multimedia formats.

Generation Z (born after 1997): They are very adept at digital formats, accustomed to technology from an early age. It is natural for them to learn through digital platforms, online videos, educational games and multimedia resources, they have a greater disposition for self-education and autonomous exploration online.

The graph shows that more than 80% is generation Y or Z, which allow digital learning initiatives naturally, 13% of generation X will accompany the wave of digital proposals and only the remaining 5% should be supported.

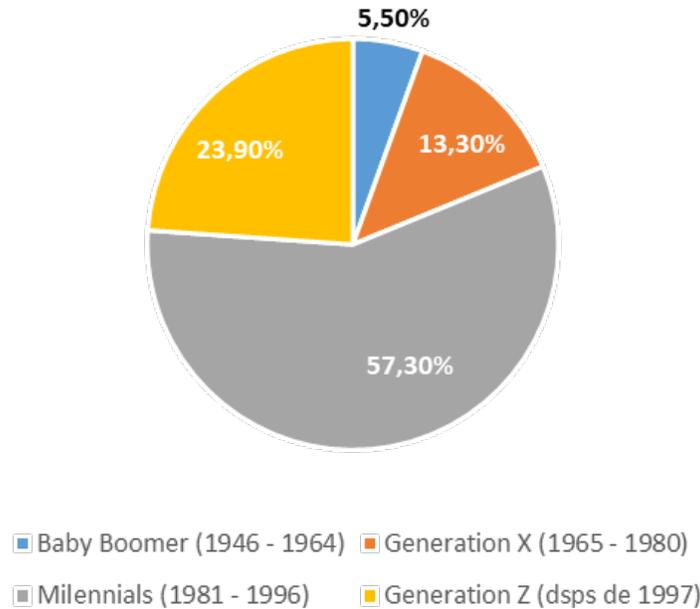


Figure 1: Percentages of staffing according to generation of belonging.

4.6.2. Survey on learning modalities

The study surveyed the technical staff (a sample of 857 responses) about the device used to consume content. The graph shows the use of the smartphone as the most widely used device, exceeding 80% in all generations, with the exception of Baby Boomers who incorporate laptops or desktop PCs to a greater extent.

The high usage of smartphones requires instructional designers to design content in responsive mode and viewable on smartphone screens.

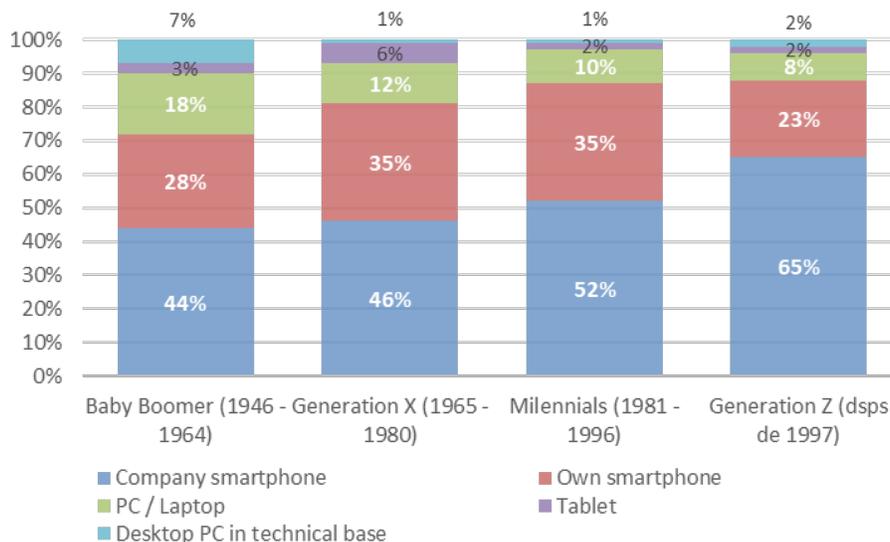


Figure 2: Percentage of type of learning device used by generation

The expected data that the younger generations have greater adoption of cell phone use is confirmed.

The other important data surveyed is on which platform they received training in the last 12 months. We found significant adoption of virtual platforms (knowledge base, e-learning) reaching 75%.

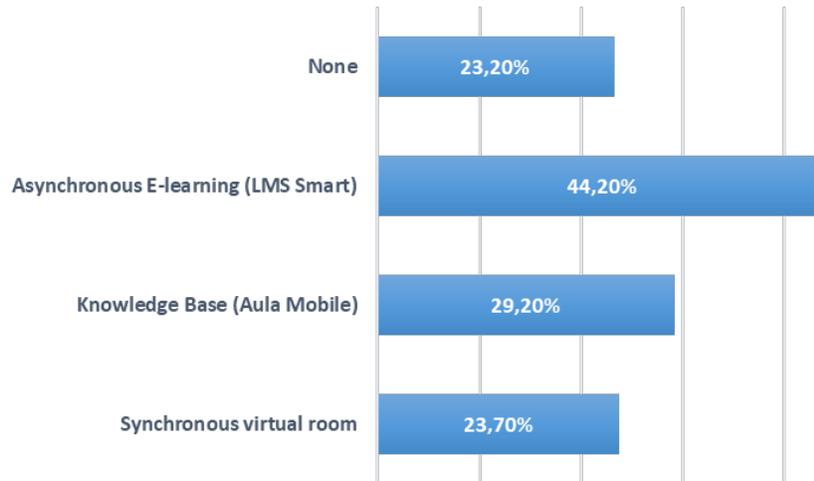


Figure 3: Percentage of Learning modality used in the last year according to the response of field technicians

The striking number that indicates 23% without training when crossed with the installed base of personnel that received training, an inconsistency appears because all the personnel received at least one training. This is because learning on virtual platforms is not perceived as formal training.

This is confirmed when the sample is asked about the valid means of training (choosing one invalidates the rest, placing them only as informative).

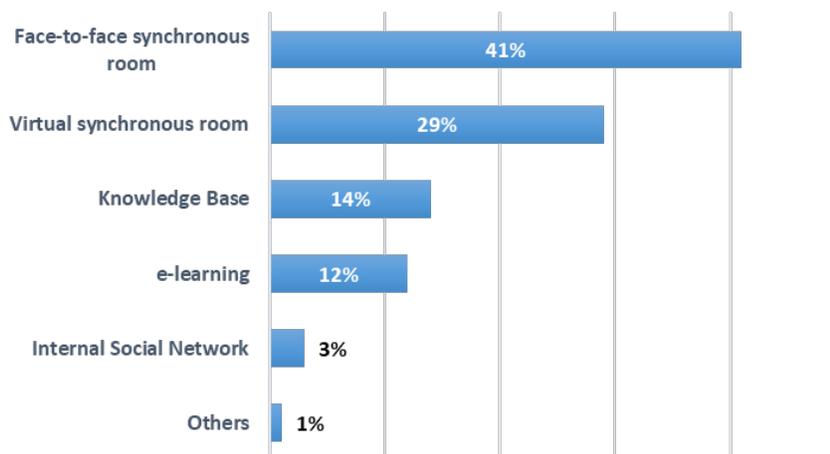


Figure 4: Learning modality recognized as valid by technicians

The endowment finds as valid the synchronous format with an instructor, whether face-to-face or virtual. For this reason, when answering about training received in the last year, it does not recognize those that were virtual as such.

4.6.3. Launch of the m-learning initiative

The generational mapping of the staff shows a high affinity with the use of technology as a means of learning. When the surveys regarding the true adoption of digital learning tools are added, it is concluded that fertile ground is available to launch the m-learning initiative through the WhatsApp messaging tool on the smartphones of field technicians. The theoretical framework developed highlights the good qualities of the model, ideal to face the context described at the beginning.

Thus, the challenge is to develop a format that is perceived by the field technician as a quality training modality within the learning ecosystem.

However, this path began to be followed several years ago on an experimental basis and this study confirms it theoretically and practically as a virtuous path.

Since 2012, Telecom has been using instant messaging groups as a means of information and informal training with its staff. The demand of the operation is clear: to be close to the field technicians with daily learning actions through a fast and easy-to-use channel during the execution of service tasks.

The first stage of deployment focused on the staff of 300 supervisors who at that time orchestrated the more than +3000 regional operations technicians with whom. The same WhatsApp mass communication tool was used, which is still used today. Technical supervisors are a fundamental link in the training of the technical staff, since they not only promote the consumption of training, but they are also the ones who must allocate the necessary time for the training of their teams.

In parallel, several focus groups were carried out with the field technicians who concluded that the best way to deliver knowledge was to achieve a direct link. As a result, it was decided to extend the scope of this messaging via WhatsApp to the more than 6,000 technicians including the operations staff, both residential, external plant and internal network, for HFC, FTTH, Mobile and Environment technologies.

The communications generate a space for consultation and learning supported by a Smart LMS (Learning Management System) on SAP and on an Aula Mobile knowledge base on Oracle. Given that the interactions take place during the field technicians' workday itself, the communication must be clear and graphically attractive and synthetic in order to capture the attention of the recipients.

4.6.4. Case 1: e-DOC - Substitution of Paper by Digital Systems

This communication accompanied the initiative to save paper through an e-DOC digital documentation app. In this way, the work orders in which the client confirmed the work carried out by means of a paper signature, the replacement of the loan book of the installed customer premises equipment (CPE) and the book of equipment withdrawal remittances, are replaced.

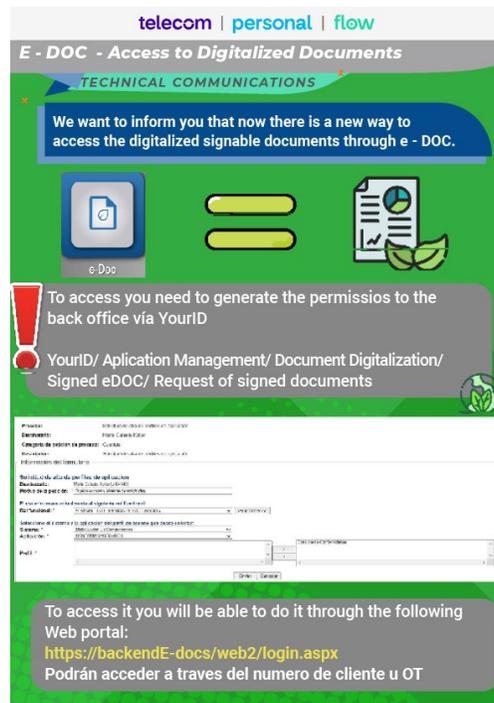


Figure 5: e-DOC. Communication board by WhatsApp

The communication highlights the benefits of the initiative and offers a video tutorial for learning how to use it through a link to the knowledge base.

To measure the impact, we take the connection of unique users to the app. During the first two weeks of April 2023, we observed a group of technicians connecting as MVPs as their first deployment. In week 3 and week 4 of April, the communications of the figure were sent with the consequent increase in usability.

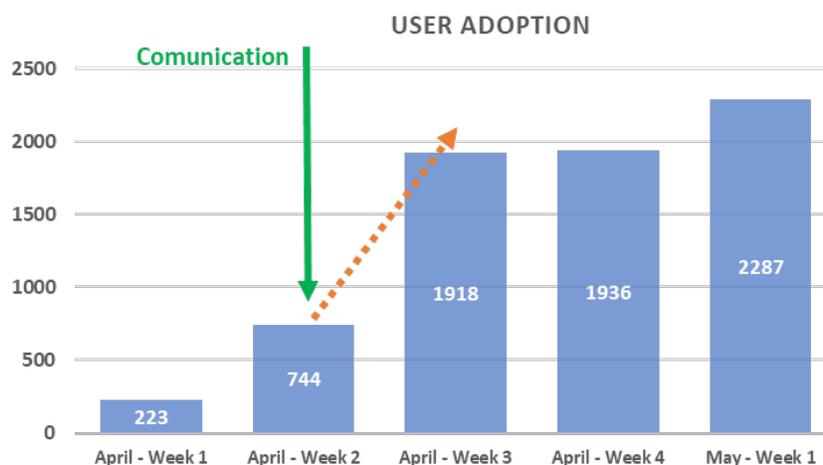


Figure 6: Impact of communication on the weekly evolution of adoption of the e-DOC App

On June -23 a reinforcement was carried out that operated as a final push for the total adoption of e-DOC.

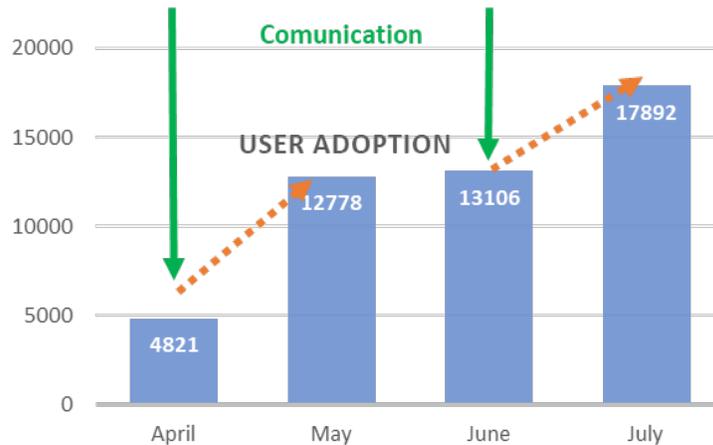


Figure 7: Impact of communication on the monthly evolution of adoption of the e-DOC App

4.6.5. Case 2: Recovery of Power Supplies from CPEs

This example is the result of joint work with the Legal and Supply area. An investigation found a large resale business for CPE power supplies. To reinforce logistics controls and raise awareness about the importance of caring for the company's assets, recovery control boards and training communications and information about the process were defined.

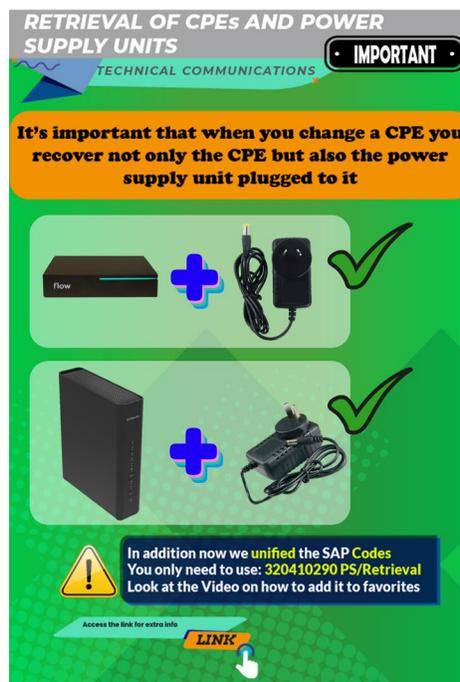


Figure 8: Recovery of power supplies. Communication board by WhatsApp

All field technicians received a mass-notification via WhatsApp to reinforce the importance of recovering power supplies (see Figure 8).

The metric used to measure the impact of the initiative is the number of power supplies entering the Repair Depot.

The first communication of November-22 had an immediate effect on the increase of recovered sources. In the fifth and sixth month after the start of the initiative, a relaxation in the process was noted, reinforcing itself in May-23 with a new communication that clearly shows an improvement in the following month (see Figure 9).

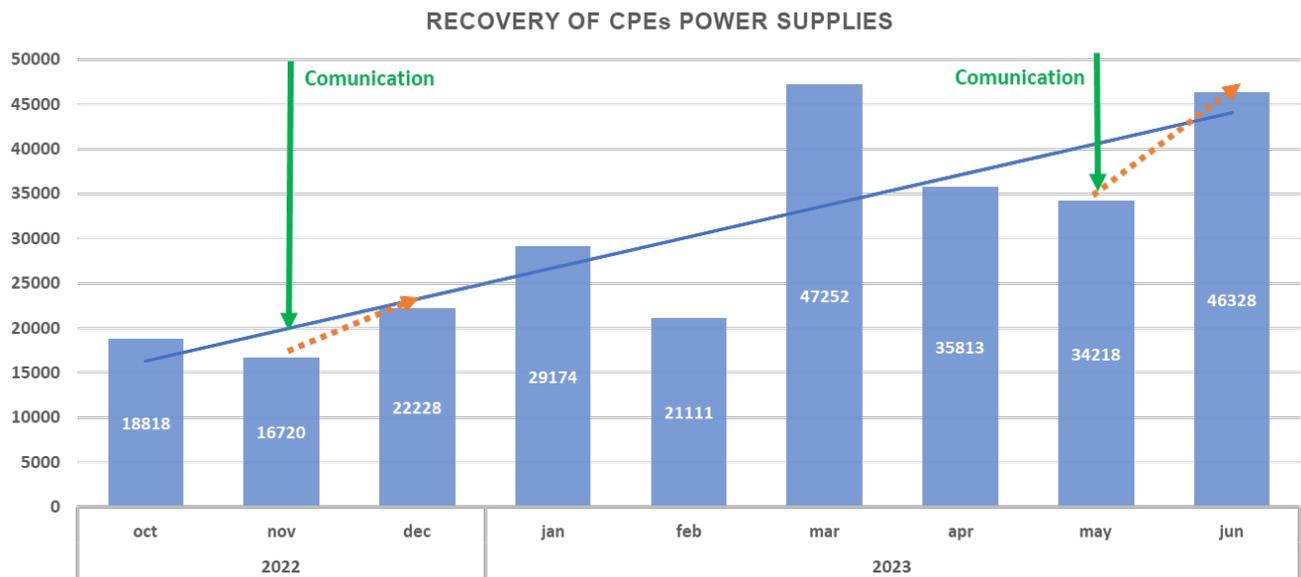


Figure 9: Impact of communication on the monthly evolution of the recovery of CPEs power supplies.

4.6.6. Case 3: Good FTTH Practices

Today, new deployments of access networks focus on technology. For years, the company evolved on HFC networks, so the fiber network is presented as a new technology that requires a learning curve and adoption of the best practices of the field technical staff.

In this context, permanent training and continuous learning are two basic needs to contain.

An analysis of the issues that most affect the service finds it to be one of the biggest failure points in the connectorization. Sensitivity to cleanliness and neatness and respect for fiber haircut measures are the focus of attention and training.

Another not minor point is the complexity and care in the use of tools and handling of materials, especially when we have various types of cables and brands of connectors, unlike coax, which after many years was able to work with a universal connector. axial compression.

The initiative in this case is a communication on the care of the connectorized, with a link to training documents stored in the knowledge base and a mailbox for consultation.



Figure 10: Good connectorization practices. Communication board by WhatsApp

The communication impact metric is the proportion of the number of connector failures within the universe of affected failures. Since the inspected samples can have a lot of variation from month to month, the analysis is carried out every two months.

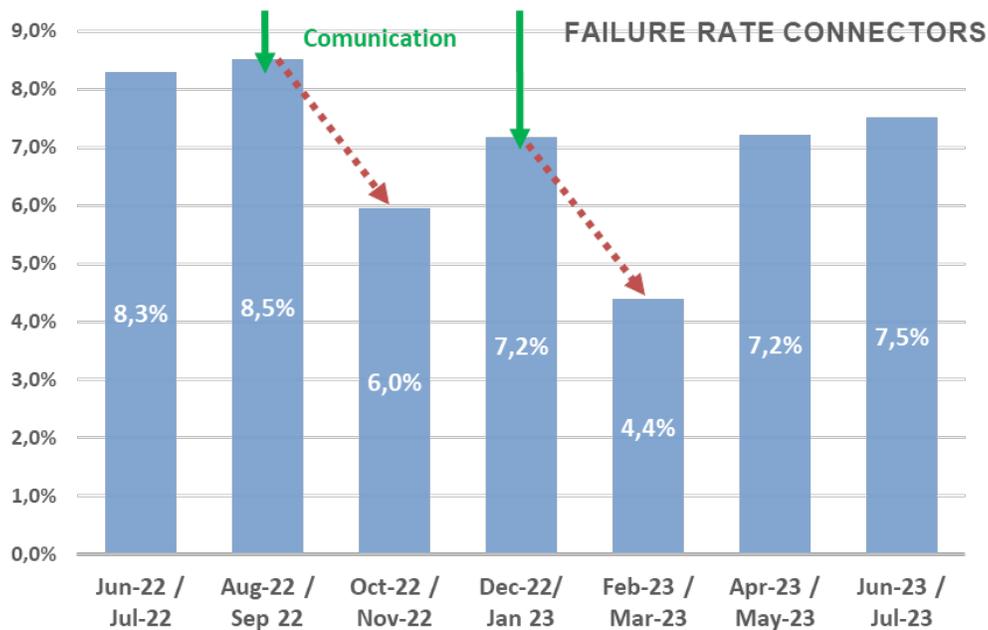


Figure 11: Impact of communication on the bimonthly evolution of the failure rate of fiber connectors.

Figure 11 clearly shows the benefits of these communications through the rapid improvement in connector failure rate.

However, an interesting phenomenon is also displayed. As of each passing two-month period, there is a degradation of this indicator, which shows the need to be in permanent contact with the field coaching staff to provide continuous training support.

This may be due to various factors such as third-party personnel turnover, Ebbinghaus¹ forgetfulness curve, lack of application in the task of connectorizing by rotation in the performance of other tasks, etc.

5. Conclusion

This study has explored from different angles the impact of m- learning through the Whatsapp platform on the improvement of company indicators. The results obtained offer a solid and well-argued look at the positive impact on these indicators.

The accessibility of educational content for field technicians, by allowing them to conveniently learn anytime, anywhere while on the job, translates into a better understanding of technical best practices, new operational processes, and adoption of digital tools. On the other hand, the universality of the use of WhatsApp offers a flexibility of formats and contents that can face not only aspects of technical learning, but also address and strengthen cultural principles, stimulate digital transformation, disseminate business information and establish sudden communications in situations short-term.

Effectively trained employees are better prepared to address new challenges and take advantage of opportunities, which is ultimately reflected in improved business indicators.

On the other hand, although it was not verified by this work, m- learning through WhatsApp can be implemented with relatively low costs compared to other traditional training modes. This economic advantage is particularly significant for companies looking to optimize their resources and maximize the return on investment in training and personnel development. This effectiveness can be measured in an increase in labor productivity and efficiency.

In summary, as anticipated by the theoretical framework, the verification of the research hypotheses supports the idea that m- learning through WhatsApp can have a positive impact on business indicators.

Flexibility and economic efficiency are key aspects of this statement.

6. Future steps

The challenge is not to confuse m- learning as an end but as part of a blended learning that seeks to enhance learning in a learning ecosystem.

It is important to take advantage of and evolve the WhatsApp space as a source of constant feedback from technicians on the effectiveness of the blended program. learning and use this information as part of a plan for continuous improvement in content and structure. That is, to collaborate in a b- learning design with face-to-face, online (e-learning) and mobile (m- learning) learning modules.

¹ "Research consistently demonstrates that memory degrades over time (Ebbinghaus 1895) and this may be one of the factors impacting the degradation here."

Developing this WhatsApp universe would allow technicians to participate in discussions and get involved with learning, share best practices, foster collaboration, and thus begin to promote social-learning.

Although the study shows progress in the monitoring of business indicators, it is essential to also design tools and dashboards to monitor the learning progress of technicians. In this way, establish certifications or recognitions for field technicians as a motivation tool and also to validate the quality of their learning.

Blended strategy learning that includes m- learning through WhatsApp will be highly effective in training field technicians. The combination of learning modalities will provide a more complete and adaptable experience, allowing technicians to learn effectively and apply their knowledge in real situations.

Abbreviations

APP	Application
CDO	Optical Distribution Box
CPE	Customer Premises Equipment
FTTH	Fiber to the Home
HFC	Hybrid Fiber-Coax
ICT	Information and Communication Technology
IOT	Internet of Things
KPI	Key Performance Indicator
LMS	Learning Management System
MVP	Minimum Viable Product
NPS	Net Promoter Score
OKR	Objectives and Key Results
ONT	Optical Network Terminal
OTT	Over The Top
SC-APC	Standard Connector - Angled Physical Contact
VUCA	Volatility, Uncertainty, Complexity, Ambiguity

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