



Acta Scientiarum. Education

ISSN: 2178-5198

ISSN: 2178-5201

Editora da Universidade Estadual de Maringá - EDUEM

Procasko, Josiane Carolina Soares Ramos; Giraffa, Lucia Maria Martins
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Acta Scientiarum. Education, vol. 44, e54333, 2022, January-December
Editora da Universidade Estadual de Maringá - EDUEM

DOI: <https://doi.org/10.4025/actascieduc.v44i1.54333>

Available in: <https://www.redalyc.org/articulo.oa?id=303371539026>

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Innovative management in digital culture context: reflections from multiple views

Josiane Carolina Soares Ramos Procasko^{1*} and Lucia Maria Martins Giraffa²

¹Instituto Federal de Educação, Ciência e Tecnologia do Rio Grande do Sul, Campus Porto Alegre, Rua Cel. Vicente, 281, 90030-041, Porto Alegre, Rio Grande do Sul, Brazil. ²Programa de Pós-graduação em Educação, Pontifícia Universidade Católica do Rio Grande do Sul, Porto Alegre, Rio Grande do Sul, Brazil. *Author for correspondence. E-mail: josiane.ramos@poa.ifrs.edu.br

ABSTRACT. This study is part of the cyber culture field and its implications for educational institutions management. The developed research investigated challenges, opportunities and implications related to contemporary management practice, facing the emergence of digital culture. We believe it is necessary to develop knowledge and practices, considering the irreversibility which the digital world presents to us. The carried out research, with qualitative approach and exploratory character, was supported by bibliographic and field research. In the field research, the instruments used for data collection were semi-structured interviews conducted with educational institutions managers that develop innovative processes, contemplating resources associated with digital technologies. Considering that most educational institutions managers did not have the opportunity to use digital technologies in their initial training (graduation), some elements were identified which challenge the management function of educational institutions in contemporary times and also provide alternatives and possibilities for innovation. As a result, we presented relevant categories associated with the management practice challenges in this digital world where digital culture pushes us to make changes on driving actions in the abundance phase of digital technologies.

Keywords: innovation; digital technologies; management challenges; educational institutions management.

Gestão inovadora no contexto da cultura digital: reflexões a partir de múltiplos olhares

RESUMO. Este estudo insere-se no campo da cibercultura e de suas implicações para a gestão de instituições educacionais. A pesquisa desenvolvida investigou os desafios, as oportunidades e as implicações relacionadas à prática gestora na contemporaneidade, diante da emergência da cultura digital. Acreditamos que seja necessário desenvolver conhecimentos e práticas, considerando a irreversibilidade que o mundo digital nos apresenta. A pesquisa realizada, de abordagem qualitativa e caráter exploratório, apoiou-se em pesquisa bibliográfica e de campo. Na pesquisa de campo, os instrumentos utilizados para a coleta de dados foram entrevistas semiestruturadas realizadas com gestores de instituições educacionais que desenvolvem processos inovadores, contemplando recursos associados às tecnologias digitais. Considerando que a maioria dos gestores das instituições educacionais não tiveram a oportunidade de utilizar as tecnologias digitais em sua formação inicial (graduação), foram identificados elementos que desafiam a função gestora de instituições educacionais na contemporaneidade e que também fornecem alternativas e possibilidades de inovação. Como resultados, apresentamos relevantes categorias referentes aos desafios da prática gestora neste mundo digital onde a cultura digital nos impele a fazer mudanças na condução de ações em fase da abundância de tecnologias digitais.

Palavras-chave: inovação; tecnologias digitais; desafios de gestão; gestão de instituições educacionais.

Gestión innovadora en el contexto de la cultura digital: reflexiones desde vistas múltiples

RESUMEN. Este estudio es parte del campo de la cibercultura y sus implicaciones para la gestión de las instituciones educativas. La investigación desarrollada investigó los desafíos, las oportunidades y las implicaciones relacionadas con la práctica de gestión contemporánea, frente al surgimiento de la cultura digital. Creemos que es necesario desarrollar conocimientos y prácticas, teniendo en cuenta la irreversibilidad que nos presenta el mundo digital. La investigación realizada, con un enfoque cualitativo

y de carácter exploratorio, fue apoyada por investigaciones bibliográficas y de campo. En la investigación de campo, los instrumentos utilizados para la recopilación de datos fueron entrevistas semiestructuradas realizadas con gerentes de instituciones educativas que desarrollan procesos innovadores, contemplando recursos asociados con tecnologías digitales. Teniendo en cuenta que la mayoría de los gerentes de las instituciones educativas no tuvieron la oportunidad de utilizar las tecnologías digitales en su formación inicial (graduación), se identificaron elementos que desafían la función de gestión de las instituciones educativas en los tiempos contemporáneos y que también ofrecen alternativas y posibilidades de innovación. Como resultado, presentamos categorías relevantes que se refieren a los desafíos de la práctica de gestión en este mundo digital donde la cultura digital nos insta a realizar cambios en la conducción de acciones en la fase de la abundancia de tecnologías digitales.

Palabras clave: innovación; tecnologías digitales; retos de gestión; gestión de instituciones educativas.

Received on June 16, 2020.
Accepted on October 6, 2020.

Introduction¹

The speed the management sceneries change in this digital world context surprises even those who are affective to change and innovation processes. Kelly (2017) already emphasized the inevitability of changes and our perception about how much around us is changing, even highlighting that in the core of all that transformation we found technology. The author also asserts that this constant flow of changes is promoted by processes, being those more important than the products. To the researcher, in this intangible digital world, everything is moving on and found in a “will be” state, which causes so much rupture and even an ‘inexorable change’.

Shall we lean on those powerful and continuous changes to keep on investigating the challenges, opportunities and implications related to the manager practice in cyber culture context over innovation processes in educational institutions, from the match of three elements: the current challenges to the manager practice, the existing technological offers, and the knowledge associated to a management function to work in a complex context. Considering that most of the managers did not have the opportunity of using digital technologies in their University graduate initial education, a lot of obstacles are present and need to be overcome in the network society. Neglecting such reality creates an incongruity between educated and social worlds. These changing times are also proper to discuss and revisit scholar managers’ education.

Even though this emerging need, it is up to us highlight that considering about management practice in education is something quite complex because it is about an action built by different subjects in several contexts, from teaching systems to educational unities².

In an educational process there is a key element that is forgotten so many times by educational policies when it comes to continuing education, especially by policies related to digital technologies incorporation on teaching institutions routine, viz: education professionals responsible by institutions management. Alonso (2007, p. 22) also warned of the fact that “[...] the simple introduction of technological resources is not sufficient condition to modernize school and make it able to respond to demands from a society whose change process is accelerated”. The researcher also points to the importance of thinking on formative processes turned to collaborative work between managers and other education professionals. Therefore, we realized the necessity of coordinated actions aiming to obtain success searching by a construction of a qualified educational institution.

To determine the manager’s role we need to have an understanding of the scholar institution’s social function against the digital culture we are living in. On Gómez (2015) understanding we are living in the digital society age, where economical, political and social attention replaces the management of raw material to information management. Those changes, emerged from the globalization process, cause an increase of social inequality mostly by its economical dimension. In that context, surface as fundamental axes to human behaviors (individual and collective) on production, distribution and consumption scopes: information, flexibility, uncertainty, deregulation, flow and innovation (Gómez, 2015). The author, searching for an epistemology of action, understands that contemporary school has as goal “[...] transform the unorganized

¹ This inquiry belongs to a Postdoctoral process that researched educational management in Digital Technologies context.

² For conceptual ends, we’ll apply in this paper the scholar management term referring to the Basic Education and/or Higher Education institutions scope.

and fragmented flood of knowledge information, i.e., organized bodies of propositions [...] that help to better understand reality” (Gómez, 2015, p. 28).

From those affirmations it is appropriate to situate two specially important concepts in this thought development: cyber culture and technology. We understand that the education process needs to follow the demands of its time by attending its needs and promoting opportunities. In face of a cyber culture context (Lévy, 2009), where contents, shapes, codes and socialization processes of new generations are modified, new demands and requirements are constituted to education institutions.

Therefore, our relationship with the world was changed by cyber culture and, consequently, our communication was radically transformed. We do not depend, for example, on fixed meaning texts, once we communicate by interconnection of messages, i.e., we bind up on ubiquitous form with communities virtually constituted, which detain a diversity of meanings and permanently renew themselves (Lévy, 2009). Cyberspace specifies the “[...] material structure of digital communication but also the oceanic universe of information that it holds, so the human beings that browse and feed that universe” (Lévy, 2009, p. 15). The author yet understands technology as a product by a society and a culture, something indissoluble to human activities.

In that perspective we understand the technology concept in an embracing way, as much as means and support to learning as organization forms of groups and spaces (Moran, 2003). Thus, technology is understood in a broad form, admitting a convergence between digital and no-digital. Franco (2006) shares those assumptions, from her wide experience in development of teachers and managers education processes directed to technology, stating that:

The technologies can be instruments to facilitate this process. Planning meetings and class council; patrimonial control; scholarly activities diagnosis; national or state educational systems analysis; school's internal and external information propagation (by a *home page*); teachers education; students, educators and community digital inclusion; and record, planning and evaluation of actions are some examples, pointed by the own participants about the contribution of these resources to the school management (Franco, 2006, p. 162).

According to the researcher we have an infinite number of possibilities to insert digital technologies inside and education institution. However, it is important to emphasize that, to manage those processes, the manager needs to comprehend the inherent characteristics to the digital culture as well as the existing transformations around information processes and triggered communications. In other words, the manager needs to transcend the simple practical use of technological artifacts in daily life to use them in a conscious and critical way, choosing the most appropriate tool for each intended situation. So, it is imperative a planning in management scope to an appropriate insertion of digital technologies.

Methodological and empirical aspects

In order to advance studies on technology and management of educational institutions, we propose to discuss in this paper the consequences of innovative processes for school management. In this way, we defined as the main objective of work to indicate the potential for school management from the processes of innovation in school based on the perceptions of educational managers.

Therefore, in this research – with qualitative approach, basic nature and exploratory character – we investigated, through perceptions of managers from innovative educational institutions, possibilities for the practice of management and continuing education processes that are developed in this current conjuncture of digital transformation. As criteria for the selection of research subjects, managers with multiple academic and professional training itineraries were chosen, those who had experience in educational management practices in use of digital technologies as a relevant pedagogical resource. These subjects are considered by their institutions as developers of successful innovative practices.

Innovation is a term considered polysemic, so, for conceptualization purposes, we corroborate Carbonell's (2002, p. 19) statement that “[...] defines innovation as a set of interventions, decisions and processes, with a certain degree of intentionality and systematization, which try to modify attitudes, ideas, cultures, contents [...] and pedagogical practices”. To carry out our study, as a criterion of choice of research subjects, we searched for managers, most of them with teaching experience, who produce innovative processes and practices, i.e., subjects that modify the broader educational environment.

The exploratory research aimed to understand the study of problems, in a way that the investigated theme/problem was explained, providing greater familiarity with the researchers. That makes possible the discovery of practices and/or guidelines that need to be modified as well as to obtain alternatives to the

knowledge that we already have. Selltitz, Wrightsman and Cook (1965) define this type of research as one that seeks to discover ideas, in an attempt to provide greater familiarity with the researched phenomenon, in order to expand knowledge about the facts.

As procedures of the carried out investigation, we used bibliographic and field research. In field research, the instrument used for data collection was organized in semi-structured interviews. That choice was made because semi-structured interviews promote a direction to the research questions and analysis categories covered by the study, focusing on a script with main questions, complemented by other questions inherent to the momentary circumstances of the interview. It should also be noted that the rigors related to the Ethics dimension in the research were respected. Thus, the interviews were carried out with the consent of the participating subjects through the signing of a Free and Informed Consent Term, in addition to the project registration in the research system that regulates investigative actions at the origin university, with the endorsement of the Scientific Committee under number 9615 – 'Educational management in digital technologies context: the implications of innovation processes in educational institutions'.

We understand methodology as an integral, alive and active part of the investigative process, which gives researchers confidence about the validity of the knowledge they have produced. However, that does not mean that any methodology adopted results in works of excellence, but emphasizes our understanding that the choice of an adequate methodology already experienced and validated contributes to the development of the investigative process. That offers subsidies to the researcher regarding the validation (or not) of the data produced and even the analytical treatment that those data will be subjected to (Minayo, 2000).

In order to understand the research subjects profile, we prepared an explanatory table with the main characteristics of these subjects. In this context of digital culture, the management of educational institutions requires a differentiated look as well as the science of the contributions of digital technologies in the multiple processes, thus, the profile of each interviewee demonstrates the constituted professional trajectory (Table 1).

Table 1. Research subjects profile.

Code	Initial Education	Last Academic Degree	Docent Experience	Scholar Management Experience	Current Position
G1	Bachelor's Degree in Informatics	PhD in Informatics in Education	24 years	10 years	Undergraduate Director
G2	System Analysis Undergraduate	PhD in Information Systems area with Postdoctoral Degree in IASP - International Association of Science Parks and Innovation areas	36 years	14 years	Innovation and Development Superintendency
G3	Computer Science Undergraduate	PhD in Computer Science	16 years	9 years	Technology Park Director of an University
G4	Agronomic Engineering Undergraduate	PhD in Management	19 years	8 years	Innovation and Development Director
G5	Journalism Undergraduate	Digital Journalism Major Specialization	-	3 years	Education Project Portfolio Manager
G6	Computer Sciences Undergraduate	Education Master Degree	1 year	7 years	Executive Director

Source: The authors (2020).

According to Table 1, the interviewees present an initial training (graduation) in multiple areas of knowledge, both in Bachelors and in Engineering. We pay attention to the fact that none of the interviewees has an initial training in Licentiate, despite almost all of them having teaching experience. In addition, as can be seen, none of the interviewees has initial training in the specific Administration area. All six research subjects, as shown in Table 1, developed their skills in managing educational processes during their professional and academic trajectory, in most cases (five of the six managers, as we see). Four of them are linked to universities and two managers have a professional relationship with a computer solutions company for education, which provides consultancy for public education networks.

From the research *corpus* exploration, constituted by the interviews, the categories were defined with their respective registration units, aiming to “[...] discover the cores of meaning that make up the

communication and whose presence, or frequency of appearance, can mean something to the chosen analytical object” (Bardin, 2016, p. 135). Regarding the definition of the categories, it is worth mentioning that they were chosen before and after data collection, following the guidelines of Gomes (1994, p. 70), i.e., “[...] those established before are more general and abstract concepts. [...] On the other hand, those formulated from data collection are more specific and more concrete”.

For data analysis, the content analysis technique was used, focusing on thematic or categorical analysis, aiming at a cut of the “[...] set of interviews through a categories grid projected over the contents” (Bardin, 2016, p. 222). The data interview analysis management was carried out by *Atlas.ti* software, used to systematically organize complex facts into unstructured data. According to experienced researchers in using that tool, the process of analyzing qualitative data through that software:

[...]allows sketching idea; take notes; register keywords; identify codes; identify themes; count words; count code frequencies; list categories; relate category to a theoretical framework; create points of view; and elaborate data visualization schemes (Vosgerau, Meyer, & Contreras, 2017, p. 915).

Thus, in order to provide transparency to data analytical treatment, we organized Table 2, relating the categories to the recording units as well as the frequency that emerged in the analysis *corpus*.

Table 2. Relation among categories, record unities and attendance.

Categories	Record unities	Attendance
Institution	Context	10
	Culture	12
	Uncertainty	6
Training	Training/Continuing Education	20
	Knowledge	8
Manager Role	Leadership (Leading, Leader)	12
	Execution/Executor	12
	Understanding	10
	Decisions/Definitions	11
	Skill/Competence	12
	People	72
	Team	15
	Communication/Communicating	24
Management Practices	Goals	6
	Planning	16
	Process	37
	Project	44
Technology	Resource	20
	Technology	53
	Tool	10

Source: The authors (2020).

Within each category, we perceive the specific incidence of some registration units. In the ‘Institution’ category, for example, we noticed that the highest incidence was the ‘Culture’ unit of record, which brings us to the question of the importance of organizational culture for developing management practices consistent with the demands of the digital age. According to Lück (2011), organizational culture is directly related to the perspective of change in habits, beliefs, values and attitudes, orienting towards a certain organizational identity. In that way, the educational institution is encouraged to objectively recognize itself and managers need to understand the constitution of the organizational culture of the educational institution to enable the necessary change processes in cyber culture.

When analyzing the ‘Training’ category, we see that the highest incidence was the ‘Training’ record unit, demonstrating the need for lifelong learning, i.e., highlighting the importance of constant updating of education professionals, because, in addition to new digital technologies emerging all the time, skills considered relevant at other times may not be considered relevant today. In the ‘Manager Role’ category we noticed that the unit of record with the highest incidence was ‘People’, in people management, conflict and interest mediation context. Gómez (2015), when referring to school challenges in digital age, considers that:

To deal with unfamiliar situations in personal, social or professional fields in open, changing and uncertain contexts, individuals need to have second-order learning skills, learn to learn and learn how to self-regulate their own learning (Gómez, 2015, p. 29).

The author considers that it is necessary to reinvent school, so it could be able to form contemporary citizens, capable of developing “[...] knowledge, skills, attitudes, values and emotions that are necessary to live in social, heterogeneous, diversified, uncertain and information saturated contexts [...]” (Gómez, 2015, p. 29). From that perspective the school needs to work with the subjects’ mental capacities, such as questioning, research, comparison, negotiation, evaluation, problem solving, management, cooperation and creation. Therefore, for educational institutions to transform, the education professionals who are there, teachers and managers, also demand that capacity for reinvention, i.e., that knowledge and mental skills to meet new demands.

By analyzing the ‘Management Practices’ category, in Table 2, we see that the unit of record with the highest incidence was ‘Project’, highlighting the importance of systematizing a clear, objective planning, with defined times and spaces. That means that, in order to think of a digital technology management project/process to be developed by institutions, we must consider the concrete situation in which these projects/processes will take place. Finally, in the ‘Technology’ category, we observed that the highest incidence was in the ‘Technology’ registration unit, which, taken in a broad perspective, transcends existing resources and relates itself to the need to build new ways of organizing spaces, groups, learnings, etc. According to Moran (2003), some steps must be developed by institutions and education systems through the following ordering: first, guaranteeing access; second, the technical domain; third, the pedagogical and management domain; and finally, fourth, is the stage of innovative solutions, which are impractical without those new digital technologies.

Results analysis

After exploring bibliographic research and analyzing the different interviews, we are presenting in Table 3, with the aim of unraveling the underlying content to that already manifested, the extraction of the interviewed subject quotes. We pointed out the most representative quotes in each category.

By analyzing the quotes available in Table 3, in ‘Management Practices’ category, G2 interviewee brings his or her perception from the occurred practices in his or her professional management trajectory beginning and also mentions the current practices from existing information volume. About that, Gómez (2015) mentions some authors that consider about the Internet emergence, highlighting that, according to them, the present conjuncture configures as a network society, which allows interconnection of virtual communities; but, to be part of that new structure, it is necessary to have a new literacy, which means learn the ‘screen language’.

Still under the author’s comprehension, we need to prepare the citizens “[...] not only for reading and writing on multimedia platforms, but also to get involved in this world, understanding the intricate and connected nature of contemporary life, becoming an ethical imperative and a technical need” (Gómez, 2015, p. 21). He also confirms the G2 interviewee perception, exposing that one of the challenges to the digital age is the development of “[...] higher order learnings that could help to live in uncertainty and complexity” (Gómez, 2015, p. 24).

In this sense, especially in managers’ education scenery, we have a long way to go on. Digital age requires intellectual habits dictated by global, by flexibility and by A era digital requer hábitos intelectuais pautados pelo global, pela flexibilidade e pela mutabilidade. About that question, the author still confirms the emergency of

[...] the capacity of dealing with higher levels of ‘creative ambiguity’, the capacity of taking risks and loving the faults and developing in ambiguity and uncertainty as conditions to the creative development of people and human groups. To create something really extraordinary it is necessary to live the uncertainty and the risk of getting lost in the process (Gómez, 2015, p. 24, author’s emphasis).

In the ‘Manager Role’ category, the evidenced manager brought the permanent need of adaptation and update. That signals the fact that the education process management in that current context requires a vision “[...] more creative, less accommodated, more participative, more ethical, more democratic and technologically more demanding” (Alonso, 2007, p. 30). The comprehension of mistakes, in that scenery, must be understood as a possibility of learning and progress.

The G3 interviewee talks about modification in the way of acting and driving discussions on the manager’s part. Other researchers already showed that question in their studies “[...] demanding that this shall be more qualified and able to assume responsibilities, take decisions and know how to search solutions” (Zednik, Tarouco, & Klering, 2014, p. 28).

Table 3. Interviewee's categories and perceptions.

Categories	Perception
Management Practices	"From a management point of view, [...] what changed was all the technological stuff that is available these days, we have a data volume, an information access volume absurdly higher than years ago, the planning cycles got faster and execution became very much smaller. The occurrence of something unexpected or unpredictable is very large nowadays. So, more than that, the most important thing is to be careful of the emerging opportunities and quickly respond to them". (G2)
Manager Role	"[...] the technology is very dynamic, we learn, we have to know how to use technology on our service, understand that it depends on the moment, that we have to know how to adapt constantly and periodically to a new technology. I think that the features of a good manager these days are [...] The "Adaptupdate". One person these days has to adapt and update constantly. A good manager has to do that, adapt and update constantly, deal with people, [...] the human-behavioral side is elementary these days [...]. Leading decisions and discussions. [...] You can not 'stick' your feet over decisions when it comes to technology, for they may change in six months." (G3)
Education	"Today, in a manager's education, the capacity of communicating and expressing by means of oratory, writing, team work, critical thinking, critical analysis, computational logic and computational thinking are absolutely fundamental. I would say today that all essential skills are in the 'soft skills' field, not contents but skills, entrepreneur attitudes, formulation of problems' solution from a solution and so on". (G2)
Technology	"I see that today we have an abundance of data, that does not mean that we have the best view and the best crossing of that information. So I think that today with all that information abundance the point is to work on the question of intelligence of these data analysis, so when we have insights and we can watch on how those insights happen and specially which others and new insights may emerge from unpredictable crossings of those information, over data mining, among other examples. But a strong analytical database that I also think needs to happen. And to that, sometimes, managers do not have education either, have data access but have difficulty to crossing and analyzing that information". (G1)
Institution	[...] I think we need to understand the technology entrance in school. So let's differ, the technology entrance in school may have an innovation effect or may have an improvement of already existing structures. So, if the technology entrance is an additional element on pedagogical practices or management practices already in progress, the challenges are very much more turned to technical questions by means of new material, the challenges are very much more logistic than [...] epistemological. Now, if technology enters as an element to promote some innovation that changes practices and that established school culture, we have a disruptive movement that breaks the status quo. There starts the great challenge of any management team [...]. (G6)

Source: The authors (2020).

In that sense and into the "Formation" category, *G2* interviewee, by experience, brings some fundamental contents that we also can understand as necessary attributes to a manager according to the current digital culture context in which we are living. Inquiring about school managers education, Alonso (2007, p. 33) considers that

[...] school managers have a decisive role by providing necessary conditions to the development of new ways of educating, where knowing, making and being intertwine themselves in an intense way, establishing the learning basis along life.

The researcher believes in paradigmatic change on roles review. Under that focus, teachers and managers, previously perceived as antagonistic in classical management perspective, became complementaries in a democratic perspective. Alonso (2007, p. 23) announces yet a collaborative education proposal among the different segments of the school community, pointing "[...] the importance of a horizontal working relationship where mutual help is essential when there is an important common goal: build a better and more effective school".

Regarding the 'Technology' category, *G1* interviewee talks about the great amount of information which we have access to nowadays. According to Weller (2011), previously the standard economic model was based on sparse contents and resources, with the advent of the digital, the sparsity disappears, emerging the 'abundance'. According to the author, the model of university and teaching and learning process are backed by the 'sparsity' pedagogy.

So, we wonder how 'abundance' pedagogy would be, what brings us possible ways to answer that by means of contributions of new pedagogies (Constructivism, Resources-Based Learning, Problems-Based Learning, Practice Communities and Connectivism). Still about that category and *G1* interviewee perception about the current existence of multiple tools, diversified resources of different technics (*software* or *hardware*) and their application on data analysis in school institutions, Giraffa (2015, p. 37) states that

[...] are supporting elements and supporters in teachers' decision making related to students' information management and shall be connected with a pedagogic project. That emphasis is important in a way to not let the

sensation of these combinations, now available to us, affect the teacher's work. No, they will help a lot in decision making and monitoring of learning and students behavior in the environment. That is also true to students who might take advantage of that information to make their self-assessment and review their processes, rhythms and study habits.

Against the shown reflections, we understand that all mentioned resources contribute significantly, though they are support, to decision making of the involved subjects on educational process, specially the school manager. So we reiterate that information management requires an affinity with institutional guidelines and, in that sense, the managers need to have the necessary knowledge to analyze data in search of the best decision.

About 'Institution' category from Table 3, G6 interviewee explains the relation about introduction of technology in education institutions and deals with the challenges produced from that understanding. About that, we highlight a study by Zednik et al. (2014) researchers who inquired a theoretical reference in order to support the processes of school management improvement with the introduction of Information and Communication Digital Technologies – ICDT to an e-Maturity process, understood as a necessity of an electronic maturity. In their research, including some skills by managers, the mentioned authors found that:

In that new age, it is fundamental that the manager comprehends that pedagogical work is the focus for school and an efficient management of technology can potentialize the pedagogical making, also characterizing itself as necessary condition to resize the administrative making, in order to facilitate the introduction of changes in management, teacher practice and school pedagogical conception (Zednik et al., 2014, p. 29).

The researchers reiterate subject G6 perception from our inquiry, addressing technology management as a potentiality in pedagogical practices transformation and, consequently, assigning new administrative practices. As we can realize and it is an important point, digital technologies appear to improve and value education processes, turning them more effective – which encourages necessary and, possibly, innovative changes – set to legal normatives and guidelines of each institution, according to their Political-Pedagogical Project.

Conclusion

In a world where digital technologies change relationships, conceptions and society behaviors we have the urgency of a perspective in digital education to understand and act in that new context. In that scope we understand that the manager is the link that boosts the education institution.

The research and introduction of digital technologies in school context, whether it be at any level we consider, has been present for more than 30 years. That trajectory provided, among other issues, several teacher formation actions, public policies for purchasing equipment, public notices for projects to promote the use and adoption of ICDT (Information and Communication Digital Technologies) in the education environment, in addition to promoting results still below the desired. Even so, we can not ignore the fact that, in many contexts, public and private, management guidance and support were crucial for effective transformations to occur.

There are also other cases where the lack of understanding of how that digital world works and how digital culture establishes itself and drives new ways of doing management prevents the implementation of effective change actions. It is not intended here to say that the only reason for such results lies solely in the responsibility of management. However, in the school ecosystem – composed of managers, teachers, students, families and employees – the connection and homologation link resides in management.

To support pedagogical innovation processes and seek resources, the educational manager needs to understand the movements and forces that, as professed by Kelly (2017), forge destinies and point out directions to a near and changing future. We know what is no longer working in the school environment and we live in the uncertainty of the near future.

In this time of global pandemic, established by COVID-19, we also have the opportunity to experience poignant ruptures, caused by instability of the lack of knowledge of what we are actually facing. A mutant virus with a new disease for which there is no vaccine and consolidated knowledge has paralyzed the social organization of the planet. We fumble in uncertainty and experimentation, mobilizing human and social capital, and exercising solidarity as a survival tool.

These questions reinforce that paradigms are broken and a new order is established. We were forced to forge a new conceptual basis to deal with emergencies. Position and action of prepared managers made and still make all the difference. We were forced to migrate to the virtual, in synchronous remote emergency meetings, to create and adapt analog to digital materials and, in these movements, we are resigning

teaching as well as educational management. New challenges and new possibilities confront the traditional model, supported by face-to-face sessions. Reviewing labor and pedagogical aspects, in addition to taking care of the technological infrastructure, the curricular review and the organization of physical spaces will be activities that will be part of the daily life of educational managers.

That does not mean that digital technologies will solve all problems in institutions, however, they are important to expedite, facilitate, mediate and actualize processes. Given the inexorable example provided by pandemic, which confirms that it is of fundamental importance to organize continuing education processes that are concerned with raising awareness in construction of conceptions and fundamentals related to the context we are living in, in addition to equipping managers to obtain digital practice and fluency. The post-pandemic context will reinforce that training emergency.

With this research we observe, therefore, the advent of five categories that emerged from the *corpus* of working analysis: Management Practices; Manager's Role; Training, Technology; and Institution. The link, the connection among those categories, in an empirical way, is the manager who needs to plan, communicate and work with other individuals in an educational environment, exercising a leadership that consists with the current emerging context in which we are living.

Herein this systematization of categories, we have two movements that involve and interfere in the model we presented: the necessary innovation processes to understand and act in that context and the pertinent challenges in that complex reality. That ranges from engaging people, focusing and prioritizing, deciding in uncertainty, overcoming and mediating conflicts, to considering all these issues from a transformative perspective.

In that sense, we consider that the theme does not run out here. We conclude that the use of digital technologies helps innovation processes in the management of educational institutions, but the decisive element in that process is the human, the instrumentalized manager, overcoming gaps left by initial training, imbued with the emergence of an effective digital education. This education shall overcome outdated traditional models in order to enhance, with the community in which it is inserted, the constitution of educational processes (administrative and pedagogical) turned to quality education, which is 'in check' in face of this new established scenery. Paraphrasing Kelly (2017) we dare to say that the verbs mobilized in management shall be remixed to form a unified moving field, in which transdisciplinary training actions shall be considered to form a manager that acts on cyber culture context.

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INFORMATION ABOUT THE AUTHORS

Josiane Carolina Soares Ramos Procasko: PhD in Education by UFRGS with Postdoctoral in Education by PUCRS. Education area professor in IFRS-Campus Porto Alegre, Informatics in Education Professional Master Degree course professor and Professional Education on National Network Professional Master Degree course professor.

ORCID: <https://orcid.org/0000-0001-7223-6889>

E-mail: josiane.ramos@poa.ifrs.edu.br

Lucia Maria Martins Giraffa: PhD in Computer Sciences by UFRGS with Postdoctoral in Education by Texas University. Professor in Escola Politécnica/Computação and Education Postgraduate Program in PUCRS. ARGOS Reserach Group Leader – Interdisciplinary Research Group in Digital Technologies and Distance Education.

ORCID: <https://orcid.org/0000-0001-8062-3483>

E-mail: giraffa@pucrs.br

Note:

The authors were responsible for conception, analysis and data interpretation; manuscript's composing and review and, yet, final version approval to be published.