INTRODUCING TECHNOLOGIES IN THE AREA OF HIGHER EDUCATION WITH PURPOSE AND MEANING

C. Frank¹, E. Del Valle², A. Frank³

¹Universidad Tecnológica Nacional (ARGENTINA)
²Universidad Nacional del Nordeste (ARGENTINA)
³Universidad Nacional del Sur (ARGENTINA)

Abstract

The inclusion of the not-so-new Information and Communication Technologies (ICT) at universities has had varying degrees of success, depending on the strategies used to approach these changes.

In most cases, due to the pressure regarding the times in which a facility should be "in production" - to justify its implementation and economic investment - as well as the short terms of political mandates (one of the problems when facing long term decision), have been a limitation when promoting far-reaching changes in the process of teaching / learning assisted by technology.

In many cases, the focus has been on providing teachers with hardware and software tools based on agreements with suppliers that "generously" make their devices available to education at low cost, thus introducing their products with the purpose of establishing themselves in the market. This avoids the comparison with other tools as well as the broader vision or generalization in the training of professionals who will later recommend what they know, in a clear unfair competition facilitated by the university. In others, the decisions were influenced by referents already trained in some type of tool, who choose to keep recommending what's known to them instead of expanding the offering of alternatives by researching and learning new technologies.

Blindly following a trend, purchases were made of a large number of smartboards that ended up being used as mere white surface to project a slide, as long as nobody had damaged it before by scribbling on it with an indelible marker, thinking it was a usual board.

University spaces deserve to follow the state of the art in terms of technologies with a rhythm that ensures at least two fundamental aspects:

- Acquire the most appropriate implements for each situation, based on an analysis of the possibilities, the requirements and the most stable market offer and with the best cost / benefit.
- Ensure training and the creation of support areas for teachers and students that allow them to have learning spaces, ongoing support and "trial and error permits" for all innovators.

Having a team of technicians and educators collaborating with the authorities in the decision making, by acting as a “technology vantage point”, will help avoid common pitfalls, or errors caused by hasted decisions without a previous and clear evaluation of the alternatives when incorporating technologies and new methods.

This publication seeks to analyze the possibility of forming an institutional technology observatory, the advantages of doing so and the justification for its implementation, listing the risks and costs of not having it.

Keywords: Innovation, technology, right-sizing, ICT.

1 INTRODUCTION AND FRAMING

The permanent need to update and improve the results in the Higher Education Area, seeking new methods and tools, promotes a questioning about the current forms of work and the introduction of new strategies and tools.[1]

Inverted classroom (flipping), online content, blended learning, distance education, BigData, Data Mining, Machine Learning, Analytics, Social Media, Blockchain, Artificial Intelligence, Cybersecurity, and intensive use of Cloud services are all must-include terminologies in any planning document aiming to appear current and up-to-date, while causing a reasonable discomfort in the sectors involved in decision-making.
The current expectation is to quickly have whole classes mounted on the network, with writings, animations and videos magically generated out of photocopied notes into an attractive and well-designed multimedia; What is also expected to happen, is having master class teachers at the front of the course turned into main actors with suitable abilities to interpret the best script of a distance course.

It is worth mentioning that this disrespectful generalization does not represent the whole system, nor does it detract from the daily efforts that are carried out in every corner of our university spaces with out-of-hours work to prepare material, attend forums and interact in virtual classrooms, all without duly compensations. But we do hope it serves to spark a discussion about the way in which we carry out this profound change without return.[2]

The idea of these lines is to try to assess particularly the areas of pedagogical and technical support that we consider necessary to develop in order to give adequate support to teachers and students to successfully incorporate these changes in their valuable daily activity, facilitating learning and the strengthening of capacities.[3]

At the same time, we will seek to share some insights about market behavior and its effect on higher education spaces that ultimately have a strong influence on society and industry.

2 THE TROJAN HORSE STRATEGY APPLIED IN MARKETING

In order to promote any product, whether it be equipment or support programs related to education, we frequently use proposals for alliances or advantages that tend toward loyalty to a product. In particular, it has always been possible to have educational versions available for those who accredit applying the products to education or external activities free of charge. In this context, and as long as such agreements do not include exclusivity contracts, it is simply a matter of facilitating the use of valuable tools at lower costs than those of the market.

This allows us to have more than one solution for each application and be able to evaluate different alternatives, which is good for universities.

However, with very similar mechanisms, it is also possible to deploy a sort of monopolization strategy where a single solution is used which doesn't guarantee interoperability with other similar tools, thus making it difficult to maintain a variety of alternatives, and eventually creeps the space and leaves the competition out. This *modus operandi*, similar to the one used for the Trojan War, consists of starting with an enticing offer that culminates in a situation of difficult return for the institutions.

Our objective, in any case, is not intended to be a criticism or evaluation of the fair or unfair play of sellers -since these do not constitute illegal practices- but to contribute in generating mechanisms of evaluation and decision-making correctly supported, since in principle nothing indicates that a single institutional solution is, or is not, the most appropriate for some cases.

3 ROLE OF THE UNIVERSITY

Several are the responsibilities of Higher Education due to its appreciation and prestige within society. These increase even more if it is, as in our case in Argentina, the Public University, supported economically with the tax burden of citizenship.

Focusing for this case in terms of ICT, decision making in the introduction of tools or methodologies includes a high degree of responsibility for its impact on the training of professionals, future social referents or protagonists in areas of governments, industry or civil society.

It is necessary to promote the highest possible degree of technological independence or at least to generate the capacity to seek products with permanence in the market, adequate terms of warranty and support at reasonable costs. It would be advisable to encourage participation in associations of independent users that facilitate the exchange of opinions, online aids, training and permanent updating, inside and outside the country.[4]

The University is usually seen as a reference to take into account, so its decisions regarding the adoption of tools will have a multiplier effect in many cases.

This set of responsibilities produces an opportunity to become the appropriate space for discussion and search for the best solution with the participation of bidders and claimants in different forums that can be organized to benefit all parties.
4 RIGHT SIZING, DEMAND ASSESSMENT

At this point it is worth clarifying that we will consider the chicken/egg dilemma resolved in terms of first taking into account the demand to promote the offer to incorporate technologies applicable to the improvement in the teaching/learning process. This is because experience has shown that fax equipment had to be first considered to be an option to improve the telex, and later to promote e-mail as an advantage for the sending of texts on networks that progressively grew until reaching the scale of current INTERNET, and so on and so forth for other solutions.

Technological shifts clearly influence shifts in existing methodologies for solving problems.[5] However, this that seems obvious, makes it difficult to promote changes while avoiding the glare of shining stones, which provoke investments on options of ephemeral existence or doubtful effectiveness. An up-to-date survey of present and potential activities in the different areas of the institution, the evaluation of the ability to face the management of programs and equipment and knowing the training needs of the personnel affected is a minimum starting point at the time of defining acquisitions and/or hirings.

5 RELATED BUT DIFFERENT PROBLEMS

The incorporation of improvements in support technologies has at least three differentiable pillars that merit their separate approach, while maintaining a strong coordination between them. We refer here to equipment, data communications and programs.

**Equipment**: Without focusing at this time on the appropriate specification that relates the application with storage capacity and processing power, as well as the necessary connectivity with other equipment or INTERNET, it is worth mentioning that it is necessary to have adequate advice regarding the state of the art and its availability in solving the needs of the present and the near future, thus avoiding early obsolescence. Also necessary is the evaluation of prices in the local market, in comparison to international prices, and the solid presence of a supplier that ensures the provision, fulfillment of warranties, and contracted services. It is recommended to reach out to previous clients of said supplier, to better assess the quality of service.

Finally, it is advisable to include in the evaluation the convenience of having self-owned equipment, compared to outsourcing and using cloud-storage or cloud-computing solutions; All without losing sight of the issues related to criticality, compliance, regional or national strategies, etc.

**Data communications**: Data communications networks and INTERNET access are for society, and for universities in particular, much more than a mere service to hire. The management of information, the stability and reliability of the communications on which most of the academic and management activity, are a current and future strategic resource, extremely critical when planning the development of any strategic plan.

We are today faced with an invaluable opportunity of collaboration where universities can assume a responsibility with a clear fulfillment of the win/win model very popular in the search for associativity. INTERNET, born in the academic sectors in the world barely 30 years ago, has grown and provided remarkable opportunities for access to information, education and a multitude of services that has come to occupy a central place in society.[6] However, the governance of the network has little proximity with the actors, despite the fact that it is promoted as a multisectoral space (ISOC, LACNIC, etc.). At the same time, the convergence of services (television on demand, telephony, INTERNET, etc.) produces tensions between the private and public sectors, which is prudent to keep in mind at the time of making a decision.

As mentioned above, there are opportunities for universities to take a more neutral role and offer, for example, the accommodation and operation of traffic exchange points (IXP) where all the wholesale and retail providers with presence in each region are connected. In this way you can program the content routing with greater efficiency and recreate an associative INTERNET by regions that avoids long and unnecessary trips for local exchanges of information.

With this type of network architecture, and promoting the deployment of metropolitan network infrastructure that avoids the overlapping of efforts and expenses, universities can facilitate and make more accessible their own academic content, while favoring citizen connectivity with public administration or health providers.
The infrastructure promoted from within the university space can become the support of all smart city projects that are highly valued nowadays.

Data management programs: All the above requires user-friendly interfaces (with all that implies) and a solid and secure handling of information behind it. In this area, the keys are open source programs, accessible documentation, and support to different types of users. The word interoperability stands out. As much for the own development as for the incorporation of programs provided externally, it is fundamental to assure the exchange of information with other existing or future systems, guaranteeing integrity and data quality.[7]

In summary: The approaches herein mentioned, are simply opinions and should not be considered an absolute truth. The intent is to spark debate and build spaces where varied useful ideas can be shared so that stakeholders can intelligently opt for one that best suits their needs.

6 DOUBT BEFORE DECIDING

Both the current and future demand and the solutions available to cover them are data that allow us to work in a framework of responsible comparison, but which do not offer unquestionable certainties.

When it comes to deciding or advising decision-makers, it is very interesting to be able to present weighted alternatives from different indicators that represent the expected needs and benefits, finally allowing us to achieve an adequate dimensioning, with a known time horizon and a possible financial economic impact.[8]

This definition will aim to achieve the most appropriate implementation for each situation, based on a deep analysis of alternatives and possibilities, ensuring the stability of the tool, its compatibility with others in use and the ability to operate them effectively.[9]

7 CONCLUSIONS: OBSERVATORY OF TECHNOLOGIES

In order to improve the capacities in terms of advice and permanent support, not only in the decision making at the time of acquiring equipment or programs, but during the implementation and monitoring of its use,[10] the creation of an Observatory of Technologies is proposed.[11]

Its integration should, within the possibilities of each institution, have specialists in the different areas that affect the definitions in ICT, such as administrators of data networks, administrators of virtual classrooms, administrators -and users- of equipment for high performance computing, pedagogues and psychologists.[12] with varying skillsets that include the programming, analysis, monitoring and administration of systems, and the design and production of multimedia material, amongst others. In terms of networks, the profiles should have experience in managing campus networks, specialists in interconnection and peering. The knowledge of national and international norms and legislations that regulate the market is a plus, as it will help avoid headaches to the institutions being advised.[13]

While maintaining universities close to the state of the art or the crest of the wave, it is essential to also evaluate stable technologies at the moment of acquisition. Except in the particular case where the focus subject is of interest for areas of research and teaching, and testing or "joint venture" agreements can be established, all highly suitable for higher education.

The challenge will finally be the coordination and moderation of this multi-sector instance, which will allow us to produce accurate and clear documentation and presentations to convey the importance of the reached conclusions, all of which should be timely produced so that the reports are available when they are most useful.

The ability to share the results with the appropriate parties so that they can profit from it, will be closely tied to the construction of "lines of trust". At this point it is necessary that the decision makers can place their trust in a team with interlocutors with strong internal links.[14] That is why it is desirable that the highest authorities participate or have a representative in the working group.

It is also convenient to have experts with extensive experience in each of the issues, using co-working and teleworking techniques, as these should progressively be inserted into the academic and management activity that is intended to be updated.

Finally, and taking into account that these lines are written from a space of management of a university network, it is suggested to integrate and complement the different groups forming collaborative inter-institutional spaces.[15]
REFERENCES


