REVISTA ESPACIOS

Virtual education in Mexico

Educación virtual en México

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Content

ABSTRACT:

This paper aims to review virtual reality as it is employed. What becomes manifest is that Mexico has structural asymmetries that do appear to make it difficult for virtual reality to penetrate deeply into all sections of the country. At the same time, the advantages of virtual reality are massive. It is concluded that the country should pursue programmatic measures that divert more money and training to virtual reality initiatives, as well as establishing partnerships with the private sector.
Keywords Customized instruction, distance learning, virtual reality

RESUMEN:

Este artículo tiene como objetivo revisar la realidad virtual tal como se emplea. Lo que se pone de manifiesto es que México tiene asimetrías estructurales que parecen dificultar que la realidad virtual penetre profundamente en todas las secciones del país. Al mismo tiempo, las ventajas de la realidad virtual son enormes. Se concluye que el país debe adoptar medidas programáticas que desvíen más dinero y capacitación a iniciativas de realidad virtual, así como establecer alianzas con el sector privado.
Palabras clave Instrucción personalizada, aprendizaje a distancia, realidad virtual

1. Introduction

Virtual education in Mexico is a topic of much discussion, even heated discussion. In this article, a close exposition and excavation of virtual education in the Mexican context will be undertaken. It will look at the advantages of virtual education in the Mexican context. It will also look at disadvantages of this teaching heuristic in the Mexican context, as well. Furthermore, time and space will be devoted to looking at whether or not a general model for virtual education can be discerned for Mexico. With regards to this last item, any such model will be explored with attention to the Mexican culture and economy as both currently exist, and have existed in the past. The paper will also contemplate some variables that need to be described and understood so that prescriptive measures can be devised that set forth a course

of action for improving virtual education in Mexico. As one might discern, the government of Mexico most certainly plays an indispensable role in bolstering virtual education in the classrooms of the country. Not least of all, it seems manifest that providing sufficient resources, and coupling the dispensation of these resources with adequate training for teachers charged with using the latest technology, will go a very long way towards making virtual education the best it can be across Mexico. Finally, in the conclusions section, time will be set aside to looking at the limitations of the research – to the extent they exist – and where the future appears headed. In the final analysis, Mexico is a nation that desperately needs the facilitative and educational potentialities that virtual education affords. Perhaps more than that, it needs the human capital that any such technological heuristics can unleash. If it can find a way to tap into this potential, then the country of Mexico faces a very bright, promising future.

Before proceeding too far, a few things must be expressed in advance of a lengthy dissertation upon virtual education and its place in the context of the country´s educational system. Mexico is an impoverished land and, as such, its human resources are perilously under-used and under-exploited. It is a country that is marred by high poverty and under-employment, and Mexico also grapples with the unfortunate reality that, to its immediate north, is a frequently hostile global power that has the capacity to wring humiliating concessions from the Mexican government and its professional and business elites. Virtual teaching in the classroom may, at first glance, seem distanced from such affairs, but the truth is that Mexico will only begin asserting its independence and freedom of action when the country has made full use of its human resources and has a large, determined, well-educated and comparatively well-educated middle class that can permit the nation to compete effectively in the international marketplace. The scalability, customizability and individualization offered by virtual teaching promises to make Mexican classrooms rich founts for learning and a fertile investment into the act of carving out a better nation that gives more to its people and to the larger world.

Reviewing the Mexican context, it must be noted that sweeping statistics are often difficult to find. Nonetheless, there is general recognition that the country has a shortage of virtual education resources and distance university education appears to be fledgling, at best (Reyes Lazalde, Reyes Monreal, & Pérez Bonilla, 2016). There is also a sense that virtual education, as a tool for enhancing critical thinking, remains underused and misunderstood in the Mexican context (Estrada, 2016). As a developing nation, Mexico appears to lag behind the use of interactive information and communication technologies to enhance learning and to reduce the learning deficits in the primary years that do appear to be a substantial issue in contemporary Mexico (Olivares Carmona, Angulo Armenta, Torres Gastelú, Madrid García, 2016). All of this essentially dwarfs the occasional success stories of software firms and private investors coming forward to underwrite projects and facilities that are ostensibly designed to marry education and virtual reality in the Mexican context (Casacchia, 2016). Virtual reality as a form of educational heuristic appears to be a very recent phenomenon, and one that is still underappreciated and underused. This is a state of affairs that needs to change, and Mexico does have within its power the capacity to do so. What is needed now is the courage to take aggressive action in creating a national architecture for these heuristics. It is most certainly possible. The imperishable focus and rationale of this paper inescapably coheres around a basic sense that virtual education can work wondrously well in the Mexican context if the right application of energy, industry, planning and resources is undertaken.

2. Methodology

The methodology for this paper rests upon the premise that the best way to truly understand virtual education in the Mexican context is to embrace a thorough, comprehensive review of the literature so as to arrive at a broad yet layered and detailed understanding of how virtual education is used in the country, where it appears headed, and what challenges and trends may shape its future. With this in mind, it is imperative to explore scholarly, quantitative and qualitative studies penned within the past generation. These sources will shed light on the

evolving nature of virtual education in Mexico and where it appears headed. Through an exhaustive perusal of the pertinent data, it should be inched much nearer to a clear recognition of what constitutes best practices, how virtual education tools can facilitate customizable and individualized instruction, and what applications can be set out to tackle learning disabilities and even behavioral infelicities amongst students. The other advantage of a comprehensive literature review is that it affords us a holistic and panoramic overview of virtual education in the advancing age of virtual reality. By seeing how far Mexico has come, where it stands, and where it appears headed, a diagrammatic representation of virtual education in Mexican schools is possible. A scrupulous review of the literature will serve as a meta-level assessment of the situation in Mexico. The implementation process will not be an easy one, but it is one that does remain achievable. But the literature is also clear that resources are finite, time is of the essence, and the political will is sadly transient.

3. Literature review

Chapter The literature pertaining to online schooling or education in Mexican society is more commonly focused upon offering a broad sketch than an incisive look at programmatic failures or political deficits. In that sense, any review, no matter how exhaustive, will be compromised by virtue of the fact that so much more remains to be written. Be that as it may, it can be adumbrated the advantages and disadvantages of virtual education, tentatively put forth a general model of Mexican schools (a model very much shaped by Mexican culture and economy), and take into account variables which ineluctably play a role in the present constitution of virtual education in Mexico. As will eventually become clear, Mexico is a nation that currently lacks the resources and architecture to impress upon the educational system an effective virtual reality framework. However, the absence of resources is not a sufficient excuse not to try, and more can be done to achieve at least the foundation for greater successes.

Starting with the Mexican economy and with Mexican culture, it warrants acknowledgement that, historically, outsiders have viewed Mexican culture as resistant to innovation and to change – largely because they did not understand sweeping technological change or innovation (Beatty, 2015). This appears to be simply untrue, as the pages to come will reveal. More likely, the reasons for a cautious approach to technological innovation are associated with a lack of civilizational confidence and with economic challenges that constrain sweeping innovation. The country has vast mineral and labour resources, and has some of the wealthiest people in the world. But structural inequality and massive regional economic disparities, often associated with untrammeled neoliberalism (Nielsen & Ybarra, 2012), ostensibly make it difficult to establish the kind of architecture that is needed for virtual reality to become a universal staple in every corner of the land. This seems the reality.

There is some evidence that virtual reality classrooms, especially when it comes to online discussion forums, can be quite useful in fostering the kind of enhanced collaboration that can subsequently lead to positive educational outcomes (Luhrs & McAnally-Salas, 2016; Fonseca, Valls, Redondo, & Villagrasa, 2016). As it stands, virtual reality can be utilized to conceptualize models and ideas, to provide real-time feedback and visual aids, and can permit iterative problem-solving (Fonseca et al, 2016). As much as anything else, available literature leaves us with the keen sense that, at least in the Mexican context, virtual education tools can serve to render more flexible the learning process via creating new modalities that invaluably bolster how learning is done, synthesized, and managed. This seems especially true when looking at the engineering sciences in Mexico (León Hernandez, & Lugo Villaseñor, 2015). It would be foolish to ignore the likelihood that virtual learning and education can give students in science and engineering dramatic new tools for ordering, conceptualizing or arranging complex equations, representations, or schemas. And, of course, such a tool has the added benefit of being both scalable and customizable. Without question, accessibility and inclusiveness are appealing aspects of virtual education that have drawn the attention of academics and educators across Latin America, not just Mexico (Amado-Salvatierra & Hilera, 2015). Thus, a

confounding variable does not appear to be lack of awareness, or a lack of appreciation for the potential boons – at least amongst academicians. Instead, if there is a confounding variable to be found, it may be political deficits or resource deficits that make the desirable improbable within Mexico.

Moving along, one confounding variable that does not expressly point to lack of funds or lack of political will or imagination, is the fact that the Mexican university system will have to accommodate a new kind of instruction that is a rather radical departure from the past. For instance, Mexican teachers need to become far more facile and efficacious – and comfortable – with the latest IC technologies. The need to retrain and recalibrate new teachers so that they might properly master and pass on to their students the new curricular innovations is an imperative that does appear in the recent literature (Romero Romero, Vázquez Piña, Baltazar Jiménez, García Palmas, Sandoval Almazán, & López Botello, 2014; Hernández-Carranza, Romero-Corella, & Ramírez-Montoya, 2015). Still, efforts to implement virtual learning persist in the Mexican context, and distance learning has been greatly facilitated at some leading national institutions – with the National Polytechnic Institute being especially prominent in using the latest ICT tools to facilitate distance learning (Pérez-Magaña, Hernández-Rodríguez, & Nazario Godínez, 2014). There is also, admirably, a strong recognition of the fact that online courses need to be designed to accommodate the different levels of expertise found amongst students when tackling a different course or subject (Peñalosa Castro, Landa Durán, & Castañeda Figueiras, 2010). But the fact that online tools allow for this kind of customizability and differentiation is overwhelming proof of why such heuristics are desperately needed in the Mexican context. If nothing else, academicians have a refreshing appreciation for the new tools available to them, while it remains for political elites to marshal the resources and will to make these exciting new tools a staple of modern Mexico. A new project at the UASLP has been conceived (as of 2010) which sees the logistical challenges facing many students striving to learn (but who reside in relatively remote areas) but for whom no other practicable avenue exists except through distance learning – and that is exactly why so many are growing increasingly enamored with what virtual education proffers (Rivera Aguilera, Rivera Aguilera, & Ramos Fandiño, 2010).

Every bit as meaningfully, the growing data accrued from the literature points to how virtual learning, by its very nature, compels students to collaborate at length with teachers for such items as work materials, tutorials, and assessments (del Carmen & Margarita, 2011). Thus, far from decrying or disfiguring the close interactions found in a conventional classroom between student and teacher, the world of virtual learning actually makes it imperative that students and teachers work together – or at least this appears to be the case in various instances. If a popularly assumed confounding variable is that virtual reality will hamper collaboration and interaction, the evidence presented in some academic circles suggests that something very different may, in fact, result.

Mexican culture is defined by a sense of familial obligation and reciprocity; paternalism – usually, but not always, benevolent – describes the relationships between employees and employers and between family members. In the context of learning, the virtual classroom can use social interaction and reciprocity (amongst teachers and students) to bring the classroom into the home. Some scholars, although excited by the possibilities, and simultaneously troubled by the omnipresent popularity of social media, do see some dynamic phenomena arising if interactive social media tools can be integrated under the broad canopy of virtual learning. Especially, they believe that digital social platforms and social networks can be effectively exploited to create interactive and multimedia scenarios that facilitate learning, the generation of ideas and learning synergies, information exchange and cooperation, and the socialization of knowledge (López Aguirre, & Mata Sánchez, 2012). Although the popularity of social media tools is beyond question in Mexico, it is not manifest that the training or methodologies exist to make digital social media an effective heuristic for learning. People can, and do, learn via social platforms, but there will need to be a reorientation of thinking if such

heuristics are to actually serve dependably as educational tools.

To this point, it is clear from the scholarship that Mexico has abundant reasons to support the institution and integration of virtual education in Mexico. There is some evidence that private businesses, not all of them headquartered in the country, are willing to invest in virtual reality learning centers and hubs in Mexico. For instance, EON Reality, Inc., recently invested an interactive digital center in at least one Mexican school as a segue to more ambitious projects aimed at creating a comprehensive virtual education approach to learning that can accommodate different learning styles (Casacchia, 2016). There is also mounting evidence that Mexico, at least not as of 2012, had anything approaching a regulatory framework for instituting and governing the institution of virtual reality in the learning classroom in the absence of best practices, Mexican institutions of higher learning have relied upon diverse and idiosyncratic means of implementing virtual higher education (García Sánchez, & Gómez Ortíz, 2012). This does appear to be one reason why management issues, as they arise in the area of online virtual education and distance learning, can be confounding and onerous (García Martínez, Hernández Chirino, Santos Fajardo, & Fabila Echauri, 2009).

In any event, the nation of Mexico is beginning to apply virtual reality learning as an implement for developing intercultural learning activities that permit Mexican children to interact productively with peers from around the world (Farías Martínez, & Montoya del Corte, 2009). The opportunities are there, the basic resources are certainly there, and there is an appreciation that virtual reality can become a customizable and scalable tool for bringing Mexican youth into closer contact with their peers from around the world. What the country needs to do is to build upon the architecture established through private business enterprises to craft a pan-national virtual education framework and strategy that makes Mexico a hub for interactive online learning. The benefits, in terms of cross-cultural learning and in terms of creating an approach that accommodates diverse learning styles, are substantial.

Virtual reality, as it shows itself in the Mexican context, has exciting potentialities. For a nation that does present some accessibility barriers to students and prospective students, virtual reality education can make distance learning facile and effective. Spanish academics, exploring recent events in California, have quickly apprehended how depth cameras and online 3D models can be used to interactively teach biology to high school students (Manrique-Juan et al., 2017). Such tools can most certainly expedite learning in Mexico, too. Moreover, there is a growing corpus of literature that ICT tools and virtual reality software can be employed as heuristics for creating technology-enhanced narratives and graphic, web-compatible novels that create common understanding and insight amongst populations grappling with chronic diseases or serious ailments (Tian, Sautter, Fisher, Fischbach, Luna-Nevarez,

Boberg, Kroger, & Vann, 2014). Such implements surely can be of great aid to healthcare professionals across Mexico who want to enhance the responsiveness and acuity of their therapeutic and rehabilitative interventions. The possibilities are potentially endless.

Virtual education in the Mexican context surely offers a chance for the students of a somewhat sprawling and topographically mountainous nation to come closer together. It also allows students to ascertain if an institution is best for them, a bit of information-sharing that is not commonplace even in 2017 Mexico. To give an example of virtual tools being employed to aid students as consumers, consider how the Engineering School of the Autonomous University of the State of Mexico has crafted a virtual reality system that allows the global community – not merely domestic student candidates – to know all about the institution´s extant facilities through an interactive walk-through that rivals an actual onsite visit (García Reyes, Valdovinos Rosas, Salgado Gallegos, Alejo Eleuterio, Muñoz Jiménez, 2014). It should also be added that Mexico is actually taking positive steps to become a leader in cybertherapy. Though the technology appears to be relatively nascent and it seems more work needs to be done (Mosso, Obrador, Wiederhold,

Wiederhold, Lara, & Santander, 2012). In any event, the above seems in keeping with a broader trend towards the perfection of augmented reality games that can be pressed into

service as heuristic devices for educational training – though it appears the technology is mostly an American innovation and not yet something at which Mexico is an international leader (Holden, 2014).

Even if it remains a prominent fact that Mexico is not yet a global leader in the realm of virtual reality education, long-standing research does indicate a waxing capacity for collaborative research and implementation ventures that offer the promise of a brighter future. For example, the National Autonomous University of Mexico (UNAM) has, since at least the start of this decade, employed integrated interactive tools that facilitate video conferencing, web sourcing, resource acquisition, cross-platform activity, and e-learning. These efforts have proved particularly efficacious in the area of medical education (Gatica Lara, & Rosales Vega, 2012). Cyber-learning communities are also waxing in number and influence within the medical field (Dziekan & Main, 2012), and Mexico is well served to strengthen its position in this area as much as possible. The country definitely needs to leverage what resources it has for maximal effect, and online is one of a few ways it can achieve a bountiful synergy.

As the aforementioned technology becomes more and more streamlined and established, it seems inevitable that new modalities will be constituted that make possible interactive experiential learning and multipoint distance learning of the highest order (Alverson et al., 2008). As a further indication that Mexico is wedded to eventually entering the front rank of nations when it comes to virtual reality learning, consider for a moment that a preliminary, formulaic virtual university was established at the Instituto Tecnológico y de Estudios Superiores de Monterrey in Mexico as far back as early 2001 (Holden, 2014). The possibility of efficacious no-verbal pedagogical agents and invigorated multimedia learning environments (Fonseca et al., 2016), seems to very much a possibility if Mexico can direct research dollars and expertise towards creating an integrated and holistic architecture that allows for scalability, individualization, and multiple medias and platforms for interactive learning exercises and lectures. The country may be lacking in some respects, but its undeniably proceeding down a better pathway. In fact, to give an idea of the progressive steps it is undertaking, it is worthwhile that some Mexican tertiary level educational institutions are now integrating mobile devices with pre-existing virtual learning environments (Ramírez Montoya, 2008). If this kind of integration becomes universal across the land, then Mexico will have a more intimately connected classroom and learning architecture than many advanced nations around the globe. And the ability of Mexican educators and academics to disseminate education will be stronger than ever.

While Mexico is not widely perceived as being a global leader in virtual reality, there is undeniably plenty of talent to be found and manifest evidence of a burgeoning virtual reality industry that will augment educational best practices from one end of the country to the other. For example, virtual reality constructions of past cultures have been pursued since at least the middle 2000s as a means of enlivening cultural and historical learning (Champion, 2005). It also seems, in a related vein, that Latin American academics – including those based in Mexico or with research interests in Mexico – are seeing how the new wave of integrated virtual reality technologies can potentially moderate the teaching of library science and its practice (Vera, 2006). If virtual reality tools can facilitate the epistemological foundations of information-gathering and synthesis, which is what seems to be at work in the case of library science and its teaching, then it is easy enough to see how the new technology is being widely heralded as taking collaborative learning in Mexico to a new level (Gómez Miranda, & Vázquez Torres, 2005).

It is imperishably true that Mexico is showing strong promise for the future, maybe even the near future. But there remain challenges. Besides the cost of effective and comprehensive implementation, a subtler hurdle is the regrettable fact that old pedagogical and epistemological practices, best suited for the anachronistic world of the bricks and mortar classroom, still seem to insinuate their way into online teaching and learning communities; in other words, there appears to be an ongoing struggle to create an inclusive, collaborative and

effective learning context online (Uribe Iniesta, 2008). What is unfortunate about this infelicitous state of affairs is that collaborative online learning could be a vital trigger in bolstering the interpersonal and communication skills of users (Pérez Alcalá, 2009). At a minimum, online learning and virtual reality education facilitates the development of multiple discursive and interactive strategies on the part of students (García Cabrero, & Pineda Ortega, 2010). And, to the extent that virtual reality can also be a real-time diagnostic tool for assessing one´s own practice in a dynamic distance learning context, it seems apparent that it does act as somewhat of an aid for the formulation of reflective electronic portfolios (Farías Martínez, & Ramírez Montoya, 2010). Teachers again, and students definitely appear to gain – even if the skills in question are not always empirical or quantifiable ones, but soft skills that may aid them in subtle ways as they make their way through their professional lives.

As this literature review draws to a close, it may be noted that virtual reality in the Mexican context, however cumbersome to initially erect, can facilitate a closer bond between teachers and pupils. Since at least 2008, Mexican scholars have remarked on how teacher-apprentice programs can be made more practicable and effective through distance learning (Ortega Barba, 2008). Flores (2010), however, remarks that public policies in Mexico absolutely need reformulation so a vital and vigorous infrastructure can be established that eliminates the nation´s digital gaps. The bedeviling presence of these gaps seems to be one of the primary reasons why Mexico´s virtual education initiatives offer more promise and potential than reality. Until such time as the resources are created that make possible the aforementioned architecture, much of the country´s latent potential – be it human resources or other areas – will remain untapped.

The advantage of virtual education in Mexico coheres around many items. However, if there is one area that should never be left unexplored, it is that area which addresses squarely how virtual reality tools can make education more accessible and more tailored for individual learning needs. While scholars have long noted that virtual learning heuristics can spark collective efficacy, greater group effectiveness, and positive behavioral outcomes amongst group members in project settings (González, Burke, Santuzzi, & Bradley, 2003), and while there is a growing appreciation for how multimodal and virtual reality heuristics can aid in the augmentation of new (and improved) pedagogical practices and competencies (Manzo Rodríguez, Alfonso Sánchez, Armenteros Vera, Farías Rodríguez, & Rodríguez Orozco, 2006), the simple truth of the matter is that virtual reality can aid those with poor spatial abilities, attention deficits, memory deficits, higher reasoning issues and those who grapple with knowledge acquisition in various subject areas. This is because it creates or engenders a relatively safe and supportive learning context that also grants students with special needs a measure of control over the entirety of the learning process (Jeffs, 2009). Such tools also aid in the formulation of enhanced social skills and interpersonal confidence and assurance (Vazquez III et al., 2015). Furthermore, there is compelling evidence that virtual reality can serve as a customizable heuristic that prevents initial or temporary cognitive impairments from becoming permanent intellectual disabilities in high-need individuals (Standen & Brown, 2006; Reynolds, 2014). For a nation that has long struggled with an appreciable population of individuals wrestling with learning disabilities – particularly indigenous women (Marshall & Juarez, 2002) and children in lower-income urban settings (Zambrano-Sánchez, Martínez-Wbaldo, & Poblano, 2010) – there is little question that virtual learning offers a scalable, adjustable or customizable, and highly individualized tool for helping students who might function effectively in a conventional school setting.

To end this literature review, the overall summation is that Mexico has made some fruitful gains, but is also a country that clearly needs to do more in terms of establishing an architecture, a comity of best practices, and a skilled teaching workforce that can take advantage of the dynamic synergies offered. The private sector appears to be quite willing to help, and it now falls to the public sector to direct needed funds (to the extent possible) to high-risk and high-need communities and jurisdictions. The advantages of virtual reality in

Mexican schools seem plentiful, and the disadvantages – temporary dislocation and upheaval, and any associated costs – do not appear prohibitive by way of comparison.

4. Results

The results of this study point to the fact that private firms are willing to invest in virtual reality within the Mexican context. The research also points to the fact that many institutions ostensibly embrace or adopt an idiosyncratic approach to the implementation and exploitation of virtual reality tools. Likewise, there is provocative evidence extant that virtual reality really does aid Mexican students and that it does compel teachers to learn new competencies – albeit such an imperative undeniably provokes discontinuities and infelicities as professionals grapple with mastering the new technology and applying it fruitfully to the dynamic classroom environment. Even if one holds that poor practices and infelicities persist even in the presence of new technologies, the number of students who can benefit from virtual reality is substantial. It is well known that high-needs and high-risk students can teach us much about interstitial failings or misguided practices and virtual reality is a perfect tool for filling in the spaces that have not yet been resolved for students who simply cannot function appropriately and effectively in a traditional classroom with traditional instruction. The results of this paper nudge irrevocably to the finding that virtual reality may be a challenge because of current deficits pertaining to apparent funding and to the online architecture present in Mexico, but this finding must also be tempered with the realization that Mexico is seeing marked growth in the private sector, along with burgeoning technical institutions, that might make what would seem otherwise to be a daunting task not necessarily so daunting at all (Chiroleu & Marquina, 2017). Generally speaking, the results of this research study suggest that Mexico can do more, has the capacity to do more, and would be quite wise to do more. Private sector support is burgeoning, and a proactive and progressive policy framework that makes possible a comprehensive, uniform virtual architecture should follow.

4.1. Limitations

If this study is limited, is it primarily because it is not a quantitative assessment of the actual impact of virtual reality on learning outcomes and productivity in the Mexican context. The absence of a regression analysis of how virtual reality impacts various learning outcomes is certainly a worthy subject for another study. Moreover, it appears as though the literature is surprisingly scant in this field and does provide a particularly useful overview of the state of virtual reality in Mexico and what government legislation has done to bring it to its current state. Mexican culture is certainly familial in nature, but it does not appear that Mexicans are constitutionally opposed to new innovations or to new modes of learning. Nonetheless, future research should contemplate if cultural confidence might play a factor in why Mexico lags behind other nations in some critical innovations.

5. Conclusions

The conclusions to be derived from this paper appear to be clear. Firstly, virtual reality and cyber-education in Mexico is comparatively nascent, but showing flashes of recrudescence. Additionally, there is private sector support, a growing culture of innovation, and multiple institutions are proving capable of utilizing the new tools to full effect. Moreover, the advantages in terms of upgrading student skills, making education more accessible, creating a greater culture of collegiality, and bolstering educational attainments for marginalized groups appear beyond dispute. The country is not wealthy, and a fully comprehensive virtual architecture that connects everyone will not be easy. But government policy certainly has an obligation to make sizable advances occur, and the capability exists to do precisely that. The critical variables – cost, available human resources, available investment from both the private and public sector – are of the sort that do not make virtual education advances within the next

few years impossible or unimaginable. Mexico has compelling reasons for embracing this technology, it has a recent track record of success, and it has a new generation of young engineers, students and teachers who can make the possible a reality. Strong public policy would seem to cry out for aggression action on this front.

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