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Virginie Servant
Eleanor Dewar

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CONTACT virginie.servant@headfoundation.org

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Virginie Servant & Eleanor Dewar
Director of Information & Learning
Research Assistant: Information & Learning
The HEAD Foundation
21-01 The Riverwalk
20 Upper Circular Road
Singapore 058416
Tel: (65) 6235 6138
Fax: (65) 6235 6135
E-mail: virginie.servant@headfoundation.org

Understanding the impact of a shift in educational paradigms

INTRODUCTION

It is clear from analysis of higher education in recent years that a major shift is taking place away from the traditional paradigms of learning methodology. Around the world, governments have responded to the change erratically, by bringing in new policies at all levels of the education spectrum, such as the 'no child left behind' policy in the USA, the 'LRU'[1] in France, and the 2007 Plan for the Evaluation of Chinese universities. These efforts have been more or less successful, but one of the greatest challenges arising from the transformation of the educational space is that of building a framework within which the change can be captured. The implications for teaching policy and systems of university response are important. Without such a framework, government efforts at reform are like pebbles thrown into a murky pond: one cannot see where one is aiming.

Every modern university campus in the United States (USA) and Western Europe has in recent years assigned specific roles to information & communication technology (ICT) within its structure, from the storage and management of data to the delivery of content and testing of knowledge. As progress in the field of ICT continues and trickles down into more and more aspects of university life, reaching out to more and more students, the role of ICT in the university structure will continue to expand horizontally (reaching more universities) and vertically (encompassing more aspects of university life).

Faced with the ICT revolution since the mid-1990's, decision makers in educational institutions have felt compelled to draw up an 'IT strategy' for their organization in order to manage the heavy cost and management implication of their institution's investment in ICT. Decision-making in university settings, especially public university settings, has been, with a few exceptions, trailing behind in the race for connectivity.

The term 'IT strategy' suggests that the strategizing should focus on the development and deployment of hardware, software and connectivity, the expansion of IT into new areas and the management of the university's existing hardware, software and connectivity. Such a strategy would overlook the true nature of the ICT revolution and its meaning for educational institutions. The revolution in information and communication technology is not just a technological revolution. The change can only be understood as a *gestalt*, of which technology, information and communication are a part but not the sum. Information can be seen as the subject matter, communication as the means and technology as the auxiliary to what is, in essence, a social revolution.

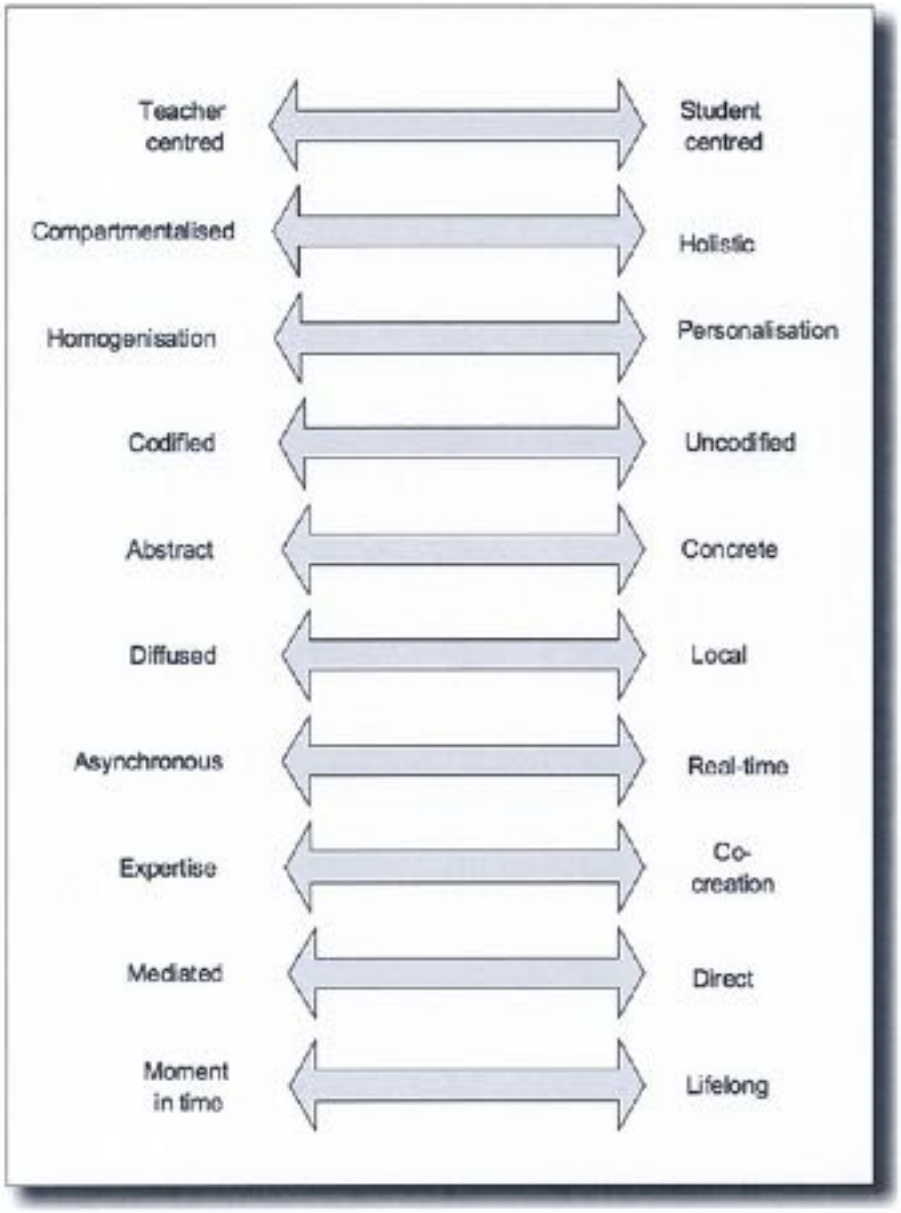
THE PARADIGM SCALE

Instead of forcing educational principles into the ICT mould, an 'IT strategy' should be heavily dependent on the educational principles that guide the decision makers. In essence,

[1] Loi de Réforme des Universités, a 2007 law which reformed the administrative procedures for university entry, required each university to open a careers advisory service and encourage greater participation of students in their university's life. It also proposed some budgetary reforms which proved deeply unpopular with French student and faculty unions. http://www.service-public.fr/actualites/00582.html

the decision maker is developing an 'IT-enhanced educational strategy'. There are ten axes or dimensions along which a decision maker can place his strategy. The position along each axis creates a unique combination of principles according to which a university learning system can be devised and enhanced by technology. A small adjustment in one of the dimensions of a ten-dimensional framework will cause a ripple effect throughout the system; the dimensions are not completely independent of one another – at their widest interpretation point, they reflect a societal mindset about learning. In times where mindsets are shifting, through choice or because the state of the world is catalysing the change, the decision makers must keep the positioning along these axes as a guide throughout the strategy building process.

FIGURE 1
The ten dimensions of decision making in learning management



Student Centred / Teacher Centred

There are a number of theories aimed at understanding the best methods for teaching and learning: perhaps the most prominent of these are constructivist theory (Piaget, 1968), the self-efficacy model (Bandura, 1986) and the social-cultural theory (Vygotsky, Luria, Golod & Knox, 1993). Though each theory offers a different explanation for the phenomenon, both the traditional constructivist approach (Pelech & Pieper, 2010) and the more recent Vygotskyian framework of education (Gredler & Shields, 2008) analyse the educational process as one that is best served by a student-centred learning paradigm.

Before discussing the existing and preferred position of educational institutions on the first axis, it is necessary to understand what is meant by these two terms. Teacher-centred learning is a practice which places the teacher as the main focal point in the educational environment. The role of the student in this pedagogy is that of a passive learner. The teacher presents him with the required information, which he must be able to repeat in his own words when requested. There are three central reasons for the use of this type of pedagogy. On the one hand, it was believed to be the best system to impart knowledge and examine the knowledge and ability of a varying test population (see Birenbaum & Dochy, 1996). In essence, pigeon-holing a student population gave meaning to standardized qualifications such as university degrees. Secondly, in a time where information was scarce, it was throught that by having one central figure to explain the major points of study, each student would be able to take in the information required to pass any examinations (William, Lee, Harrison & Black, 2004). Finally, there is a cultural bias in favour of teacher-centred learning in many countries.

The second paradigm is student-centred learning. In this paradigm, the learner becomes the central figure in his own education. The student must learn through his own interactions with the world and other people he comes into contact with. The role of the teacher is that of a facilitator of knowledge and a guide through the learning process. This moves away from the teacher as the only source of knowledge, and requires the student to be an active participant in gaining information (Hughes, Ventura, & Dando, 2004). Due to a higher level of interaction with the research process, students have greater depths of knowledge than their peers who go through teacher-centred learning, and are more accurately able to gauge their own academic level (Levine, Kelly, Karakoc & Haidet, 2007).

Compartmentalized / Holistic

The compartmentalization of education is the act of breaking up the learning process into specific fields and sub-fields, such as neuroscience, French law, Spanish literature and subsections thereof. A holistic approach, on the other hand, places emphasis on the learning experience as a whole, focusing on the learning process and the development of the learner's personality rather than being attached to the specific practices of a field. Scholars in the field of education concluded that 'the basic premise of holistic education is based on its focus on relationships – the relationship between linear thinking and intuition, the relationship between mind and body, the relationship among various domains of knowledge, the relationship between the individual and the community' (Pan, Pan, Lee & Chang, 2010, p.199). This type of learning would typically merge various fields of interest to put together a comprehensive learning programme where the learner is encouraged to draw bridges between the fields that he is interacting with.

Homogenization / Personalization

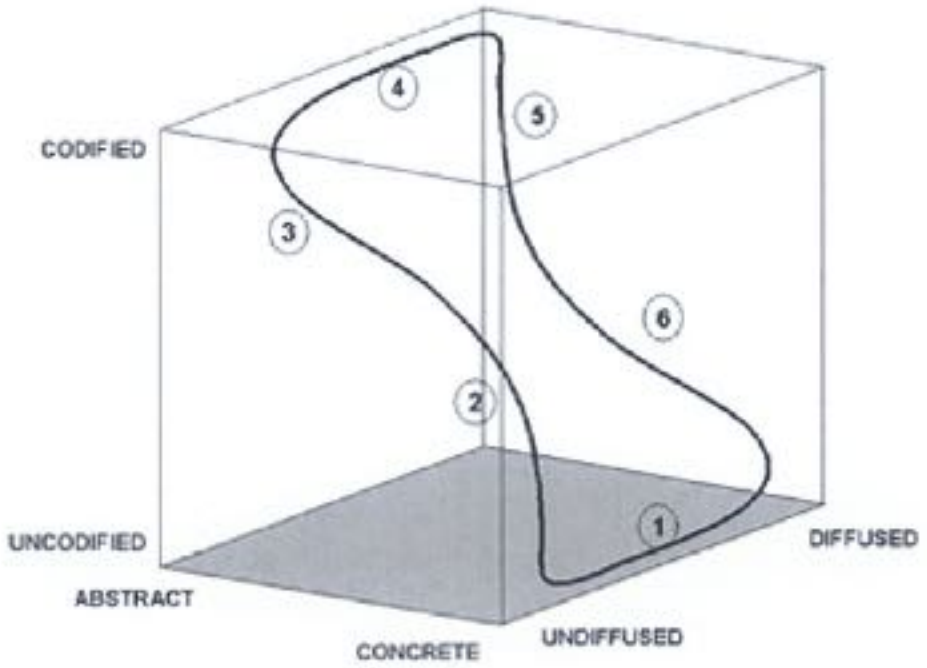
The debate on the personalization of learning has been ongoing in educational institutions for a long time. Some systems, like the French system, have an ideological attachment to homogenization, believing that by giving everyone the same materials and the same teaching, everybody will have an equal chance in life[2]. Other schools of thought are located at the polar opposite of this homogeneistic line of thought. This is reflected in Montessori (Montessori, 1912), Steiner (Steiner, 2004) or Dalton school (Parkhurst, 1922) systems. In these systems of schooling, the educational process focuses around the child as a whole individual with specific needs that cannot be addressed by a one-size-fits-all education. These systems have been developed for K-12 education, and the lessons learnt have not, to the best of our knowledge, been applied in a university context.

Information Space

In 1995, Max Boisot published a revolutionary book entitled 'Information Space'. In this information space, he identifies three axes which form the three dimensions of the space. The first is the 'uncodified – codified' axis. Uncodified knowledge cannot be captured in writing or stored without losing the essence of the experience it relates to. Codified knowledge, however, is structured such that it can be recorded and passed on without damaging the meaning of the information being transmitted (Boisot, 1995, p.145). The second axis considers whether information is 'undiffused' or 'diffused'. Simply put, undiffused knowledge is the property of one individual, and has not been shared. Diffused knowledge is shared with a more or less wide community of people. Finally, information moves along a 'concrete – abstract' axis. Concrete information is defined in relation to the immediate circumstance in which the information is presented. Abstraction, however, 'saves on data by correlating features of the forms so defined on the basis of shared attributes, thus avoiding the need for independent description or treatment' (Boisot, 1995, p. 175). The institutions that structure societies are defined by Boisot according to their position in the Information Space. He has developed a theory of the social learning process (the Social Learning Curve) that occurs as a movement in the Information Space, but for the purposes of this section, our interest is in the three dimensions of communication of information that the book identifies.

FIGURE 2
Boisot's information space and the Social Learning Cycle

[2] This is known as the *égalité des chances* policy, and was put to paper by the Langevin - Wallon plan of the 15 March 1944. The premise is that all children should be given the same chances by the education system, regardless of social background, sex or race. This text has served as a reference for French decision-makers in education ever since. See the works of Marcel Crahay on the subject (Crahay, 2000)



Real-time / Asynchronous

Real-time experience-based learning is akin to practice-based learning, with the added condition that the practice takes place as the conditions in which the knowledge is used outside of the educational context occur (for instance, at the site of an eruption, for volcanologists). Instead of learning from second-hand experience, the student is plunged into the heart of the matter, and asked to take part in a real-time exercise where a different set of skills will be used as compared with written examination. Although practice-based learning has always existed, especially in fields like medicine or engineering, the advance in technology makes it feasible to imagine situations where politics, law or biology students would be able to transport themselves to learning situations as they occur without having to be there physically. This is already being done in virtual environments such as Second Life, where students are being asked to complete tasks in simulated environments in real-time. The progress in 3D immersive augmented reality technology means that it will soon be possible to interact with the 3D images projected in real space. This has all sorts of exciting implications for educational simulations.

Except in the specific fields mentioned above (and a few other exceptions), educational systems have by and large preferred book-based, second-hand, asynchronous learning rather than learning in real-time situations, even though a large body of research has proven the efficacy of practice-based learning in improving the student's understanding of the subject matter in the field of medicine (Ogrinc, Headrick, Morrison & Foster, 2004), (Didwania, McGaghie, Cohen & Wayne, 2010). Studies are only beginning to explore the possibilities offered by mobile technology for enhancing real-time and practice-based learning (Morken, Divitini & Haugaløkken, 2007), but all indications are that an increase in the balance between real-time and asynchronous learning experiences would benefit the learner.

Expertise / Co-creation

Traditionally, the academic system relies heavily on expertise to guide the learning process. What is a professor, but a subject-matter expert who is qualified to talk about his subject? Quite apart from the obvious but often neglected question of the suitability of experts to the art of teaching, the ban on Wikipedia in universities reflects the deep suspicion that the academic world harbours for user-generated content. In the business world, 'crowd-sourcing' is the best known act of 'co-creation'; the reliance on the collective output of the crowd via web 2.0 is fast becoming a favoured method of doing business amongst young, energetic companies. Its use for educational purposes is a relatively untrodden field of research, but the co-creational aspect of education is featuring more and more prominently in the debate on higher education[3].

Mediated / Direct

With the advent of IT in education, the balance has been shifting towards mediated forms of learning, in which there is a medium such as a computer screen, a book or a TV monitor in between the learner and the teacher, other learners and knowledge, rather than direct contact between learner and teacher, other learners and knowledge. Most universities are still trying to strike the balance between mediated and direct learning. Some have gone all the way in the transition to mediated education by providing exclusively online courses where the student never meets the teacher or other learners and gains access to the knowledge through his computer screen. In traditional societies, it is still very much the case that knowledge is passed on directly between teachers and learners. More and more, universities are moving towards 'blended' learning, in which the learner's experience is divided between a direct and mediated learning experience.

Moment in Time / Lifelong learning

The debate about lifelong learning has received as much, if not more, attention than the debate on student centred learning. As early as the mid-1990's, UNESCO and the OECD were investigating the benefits of shifting the focus of education to lifelong learning. In 1996, the Commission of European Communities called for a 'Year of Lifelong Learning'[4]. The Commission summarized the debate as follows: 'Preparation for life in tomorrow's world cannot be satisfied by once-and-for-all acquisition of knowledge and know how. All measures must therefore necessarily be based on the concept of developing, generalizing and systematizing lifelong learning and continued training.' (as quoted by Field, 2006, p. 16) Although Sharples (2000) argues that there is no single definition of lifelong learning, we can agree that educational decision makers have to situate their policies on a dimension which encompasses 'moment in time' learning, such as a year-long course leading to a qualification, and incremental, prolonged exposition to the learning process. One does not exclude the other. As with all the other dimensions of the learning paradigm, the decision maker must aim to strike the balance which best serves the interest of the learner. There is much literature on the subject, which is referred to in the references to this paper.

There is no right and wrong *per se* in the balance that is chosen between the ten dimensions. The place which is chosen on each axis will simply reflect the objectives of the educational

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[3] See, for instance, the topics of the conference on 'Enhancing Learning Experiences in Higher Education' (Held in Hong Kong, 2-3 Dec 2010) http://www.cetl.hku.hk/conference2010/theme.htm

[4] http://ec.europa.eu/education/lifelong-learning-policy/doc28_en.htm

institution, as translated by the particular pedagogues involved in the learning process; whether that is training students to correspond to the needs of a particular industry, creating broad-minded generalist citizens, or anything in between.

TRADITIONAL SETUP

Traditionally, educational institutions around the world have adhered to particular patterns on the ten-dimensional scale. The chosen pattern has been influenced by the ideals of the decision makers and the prevailing educational culture in the university's country of establishment. This in turn has been heavily influenced by government policies on the matter.

Western European higher education

To place Western European higher education in one category is to put together different systems based on different schools of thought and different approaches to education under the same umbrella. However, despite their differences, the educational principles of the varying western European systems have more in common than not, an aggregate comparison is usefully made against the underlying principles of Asian university education.

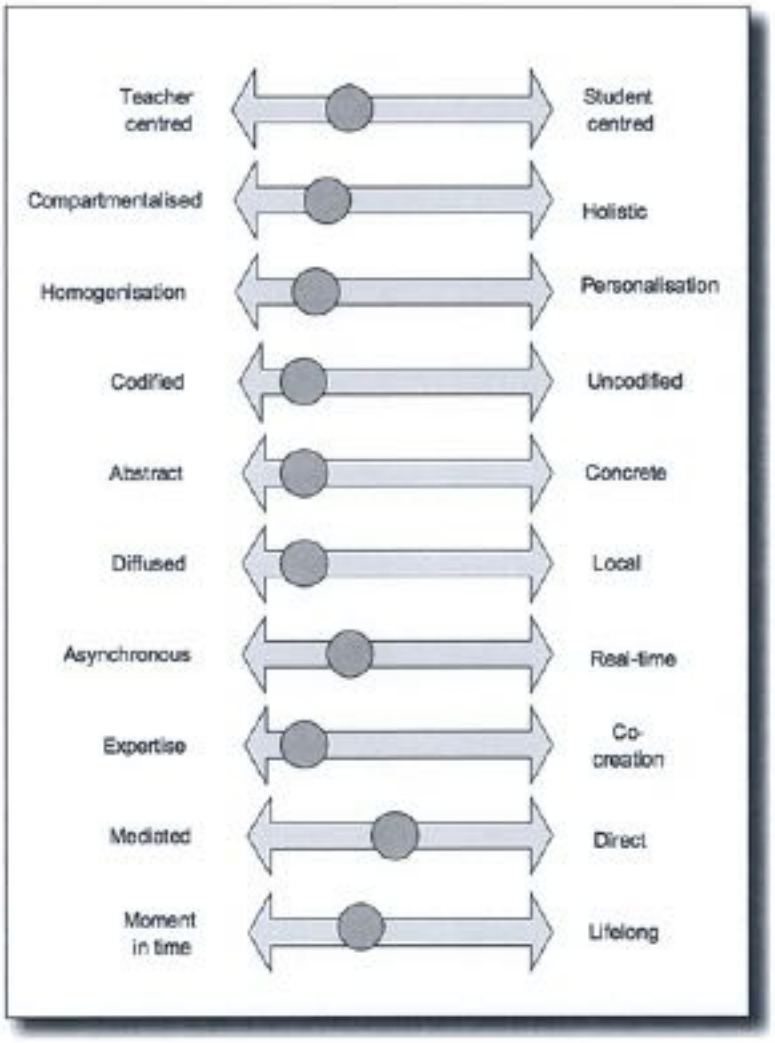
Western European education is heavily biased in favour of codified, abstract, diffused information, where expertise is the centrepiece of the academic model. This means that Western European educational institutions have a scholarly approach to knowledge, where what is considered worth learning in a higher educational context has been developed by a community of scholars who have debated the subject at length and produced a body of theories and practices applicable to their field.

Most of the teaching in western European universities is compartmentalized, homogeneous and still heavily teacher-centred. This is not true in all cases; as we have seen, some systems have an ideological commitment to homogenization and others do not. In general though, Western European education is biased towards compartmentalized learning. By contrast, some other western systems outside of Europe, such as the USA, have taken a more holistic approach to the first years of higher education (the reverse T-shape model), where the first couple of years are spent learning general skills which are then applied more specifically during the Masters degree. Although efforts have been made to make students responsible for their own learning, most western European institutions have been making small amendments or additions to an essentially teacher-centred framework, and a true student-centred learning model has yet to emerge. The advent of IT in education has been a mixed blessing; whilst fostering small changes in the system, it has stifled true educational innovation, because many decision makers of the pre-digital native generation believe that producing an e-learning system will automatically push their institution into the 21st century. As a result, the balance has been shifting towards mediated forms of learning rather than direct contact between learner and teacher, without the pedagogical overhaul needed to truly modernize the western European educational system.

The systems which we see in western European higher educational institutions tend to leave behind students who do not fit well with the requirement of the system, but gives successful students high levels of understanding of abstract, diffuse and codified information, enabling the kind of high level academic output that comes out of British, French, German and other

western European universities[5]. It does, however, somewhat discourage student initiative and innovation, favouring best practice over creativity. Events are in motion, however, to shift the balance towards the right of the diagram.

FIGURE 3
Typical principles that guide western European education



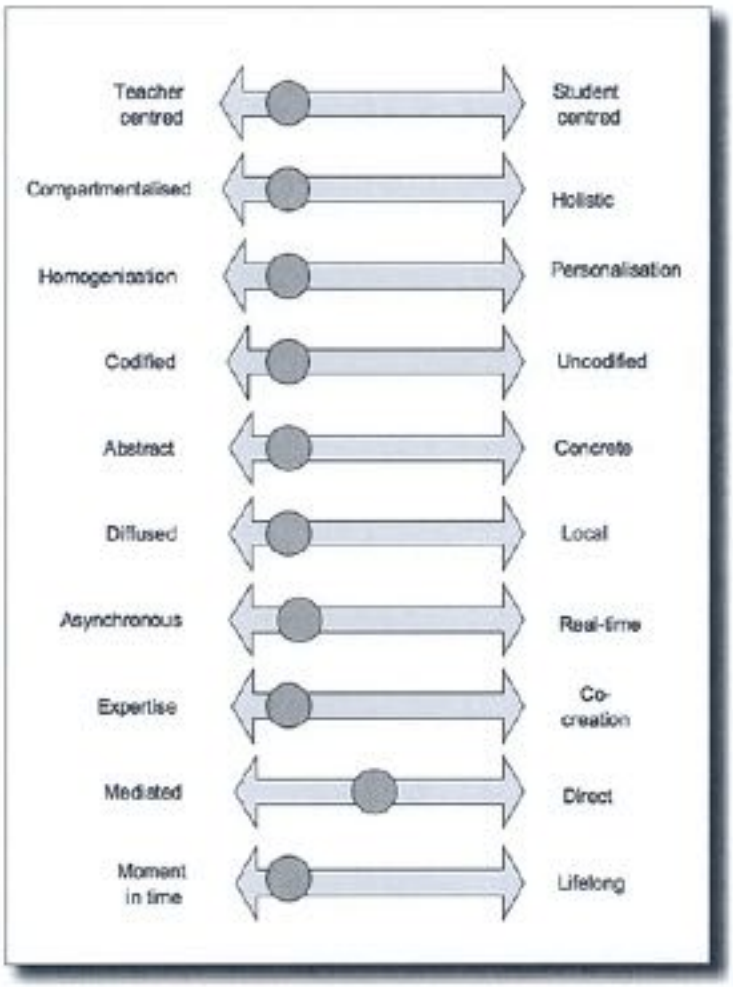
Pacific Asian Higher Education

Once again, the denomination 'Pacific Asian' encompasses many different systems, probably more culturally diverse that the systems found in Europe. Confucian Asia differs quite dramatically from the states with a majority Muslim or Christian population, and other Asian countries appear to have so insular cultures that they cannot be understood in terms of any other culture. As in Western higher education systems, however, there are underlying trends which can be aggregated to form a picture of Asian higher education. In this aggregated system, the entire learning process is centred around the delivery of highly codified, abstract

[5] ARWU rankings 2010, 25% of the Top 100 were Western European Universities (http://www.arwu.org/ARWU2010.jsp)

and diffused information from the teacher to the students through an extremely compartmentalized and homogeneous delivery system than leaves almost no place for cross-fertilization. Learning is mostly asynchronous and second-hand, as delivered by the teacher, who is the holder of knowledge (see Chan, 2010, Pelgrum & Anderson, 2001, Saito et al., 2008). Students are expected to take in the knowledge that is being delivered to them, and be able to recite it during examinations. They do not engage in 'deep' learning (Rodrigo, 2003), but rather take in information that they do not always understand. Research has shown that while students in Indonesia were enthusiastic about the idea of co-creation and problem-based learning, the faculty were much less so (Saito, 2008). Pacific Asian government understand the challenges of 21st century education, possibly even better than their western European counterparts, because they understand (and sometimes fear) more fully the potential of the information revolution.

FIGURE 4
Typical indicators for Asian education



Whilst Western Europe faces institutional resistance against change, Pacific Asia faces cultural resistance. Yet both are going to have to tackle these resistances if they are to face up to the challenges of the 21st Century; not only to stay competitive at the international level, but also to face their own internal demand.

TOWARDS A NEW PARADIGM

In the two examples given above, we see a strong bias towards the left side of the diagram, which could be labelled a 'traditional' approach. Since in the Asian context, all indicators are almost as far left as they can be, if a movement occurs, it can only be from left to right. Therefore, the further the indicators shift towards the right, the more novel the educational paradigm thus defined. We use the word 'novel' to describe the movement of the indicators, because such a movement still needs defining. In recent literature (Pelgrum & Anderson, 2001, Pelgrum & Law, 2004), it has been referred to as a shift from 'teacher-centred' to 'student-centred' learning, often described in Vygotskian terms (Liu, Liu, Bao, Ju & Wang, 2010, Beetham & Sharpe, 2007). The extensive research that has been published on the subject has produced a consensus on the disadvantages of teacher-centred learning over student-centred learning for the learner's development and achievement. Many such disadvantages have been listed and analysed in the educational psychology literature of the past 10 years (see references).

First, in a typical lecture, teachers often use materials with which they are familiar, without updating their information (Åkerlind, 2004). This creates three problems, the first being that the students do not have access to information that they will need in a real world work environment. The second problem is that in the age of Google, some students may enter the classroom with more up to date knowledge than the teacher. Thirdly, teachers in this model are not given the same degree of feedback as their colleagues working in a student-centred environment. Without this feedback, they are unable to adapt their class for prime performance.

Second, research findings have indicated that students are less engaged with their learning and are less likely to wish to study outside of teaching hours under the teacher-centred system (Entwistle, McCune & Hounsell, 2003). Research on student-centred learning has indicated that students become more active in their course and are more likely to engage in unprompted research (MacLellan & Soden, 2004). In fact, a structured control system of education, giving the students supported control over their education, is likely to be the most successful method for increasing student motivation (Maclellan, 2008).
Third, from a Vygotskyian perspective, student-centred learning encourages group tasks, and in so doing causes an overlapping of participants' ZPDs[6]. Because each individual comes to the group task with their own inner ZPD circle, they must exchange information, beliefs, ideas and abilities to be able to complete the task, thus expanding each other's inner-circles.

Finally, the teacher remains a key figure, but in the student-centred paradigm there is a progression. In neo-Vygotskyian terms, the teacher supports his students through supportive scaffolding (in which the teacher helps students to gain new knowledge), through to the final stage of complex process scaffolding (where the teacher helps guide the student in the use of their acquired knowledge) (Azevedo & Jacobson, 2008).

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[6] Zone of Proximal Development (ZPD); is the area of pre-existing skills, knowledge and ability possessed by a person. This zone of knowledge is in turn surrounded by everything that they have the potential to acquire; outside of this lies information, abilities and skills currently beyond their cognitive or physical ability (Cole, John-Steiner, Scribner & Souberman, 1978).

The shift has already begun to take place around the world. It started in the early 20th Century in the West, with the ideas of Maria Montessori, Helen Parkhurst and, later, George Steiner (described above), but with the revolution in ICT, the movement has taken on a different shape: it is getting wider, horizontally and vertically, it is moving faster, and it is being portrayed as inevitable by scholars in education. For instance, a research project conducted in upper primary and lower secondary school level in Australia found evidence that teachers who were able to share information over the Internet were able to increase their students' learning potential (Yelland, Cope & Kalantizis, 2008). The spearhead of the movement towards student-centred learning can be found in Singapore, where, to maintain the country's status in the academic world, the government are encouraging innovative and creative student-centred learning (Looi, Hung, Koh, & Bopy, 2004). The best example of this is the Singapore Learning Science Lab (www.lsl.nie.edu.sg).

Taiwanese scholar Tak-Wai Chan's forecast of the future of ICT in Asia indicates that a movement towards student-centred learning is not only possible, but inevitable in Asian classrooms (Chan, 2010). His conjecture may seem a little far-fetched, considering the cultural implications of the shift, and indeed, research has shown that the 'rightward' movement is facing hurdles. For instance, a year-long study of the production of an e-learning course between Taiwan and China (Young & Ku, 2008) found that e-learning caused problems for Asian academics struggling to cope with the demands of ICT. This struggle is mirrored in Pelgrum & Law (2004). Saito (E. Saito et al, 2008) pointed out the difference in adaptability to new pedagogy between Indonesian academics and students. Their findings showed evidence that the student participant group was more adaptable to the pedagogical change than the faculty.

Whilst the research on student centred learning is growing and the results are very promising, we can immediately see from the diagram (Fig 1) that it is only 1/10th of the picture.

WHAT THE NEW PARADIGM COULD LOOK LIKE

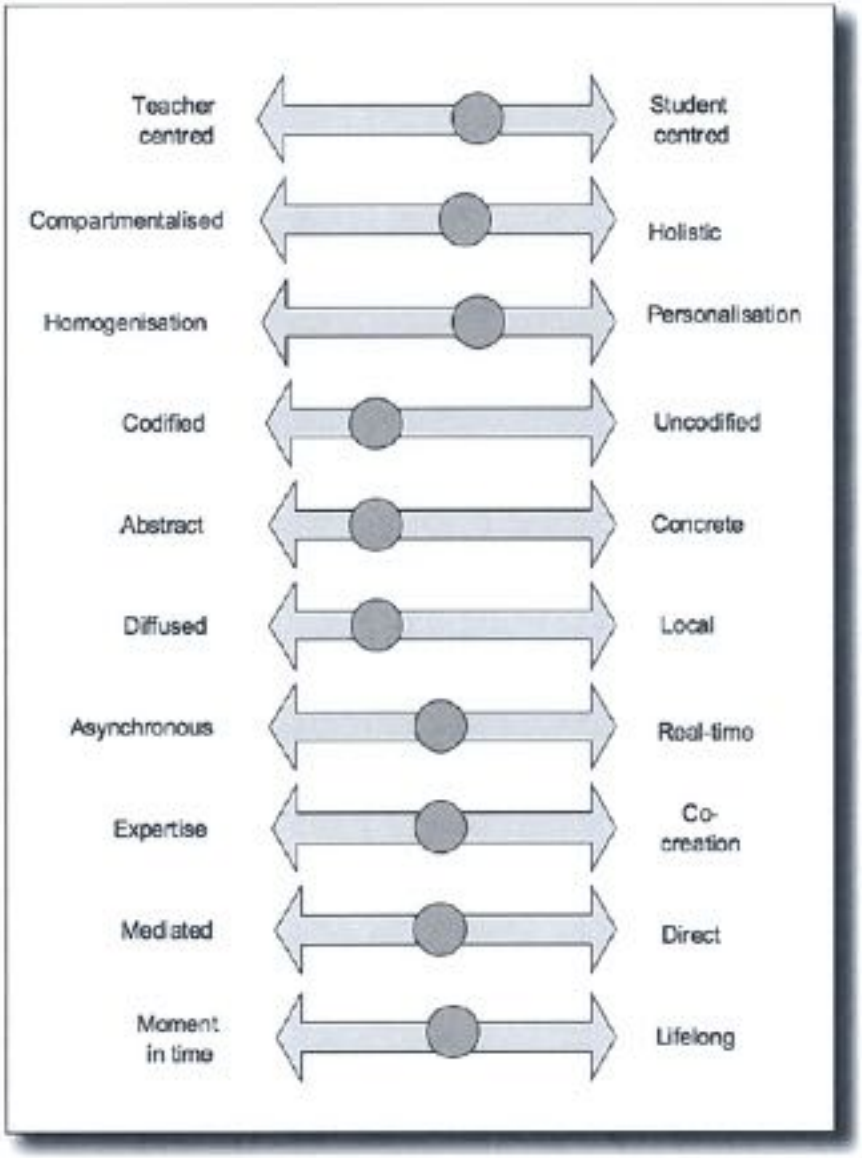
The greatest ideas always emerge at the dawn of a revolution, when everything seems possible. As we race through the ICT revolution, we find ourselves at the dawn of the educational revolution. As we have seen, the revolution has made its first timid steps with the move from a student-centred to a teacher centred learning, but when it reaches maturity, it will encompass all ten dimensions cited above and perhaps more.

In the new era of education, we can imagine that the learning experience is exclusively centred on the learner. This is a system where the teacher would turn into a facilitator of knowledge and a mentor for the learner rather than a repository of information, who will provide the student with the building blocks and cognitive capacity to intake, analyse and use information. Providing a learner with the tools to turn data into information, information into knowledge, knowledge into understanding, and perhaps even understanding into wisdom (Ackhoff, 2001) will create a new type of self-motivated, open-minded individual with the capacity to learn for life.

The human mind and body work as whole entities, and any division into compartments of knowledge is sub-efficient. This is the thinking behind holistic learning, and whilst we are not advocating that all subject matters be blended into one large life experience (would you trust a 'holistic' surgeon who had not undergone specific medical training?), the kind of learning

promoted in the new educational paradigm would be more holistic than it is currently. This will foster an atmosphere of cross-fertilization in the learning environment, where disciplines question each other to find new answers. A certain level of compartmentalization remains necessary and beneficial for very specific disciplines that have very specific applicability (medicine, engineering, law etc.) and which are very training-heavy. This fits in rightly with the inverse-T shape model of education in practice in the USA. The mind of a student who has experienced the cross-fertilization of ideas is encouraged to perceive a myriad of creative possibilities, away from the beaten path of best practice. The greatest new ideas often come from the crossing of disciplines and the shedding of new light on old ideas. It is the function of the learning institution to promote this flurry of creativity by inviting a more holistic approach to learning.

FIGURE 5
A possible interpretation of the new educational paradigm



It stems naturally from our first two dimensions that the learning experience would be personalized. As we stated when we introduced the model, the ten dimensions are not wholly independent from each other and do not exist in a vacuum. The movement of one necessarily

affects the others. This type of personalized learning is made possible by combining well-trained staff and faculty with personalized learning technology and adaptive environments. Homogeneity of learning methodology is not the same as homogeneity of content. In fields like medicine and engineering, homogeneity of content is inescapable to some degree. This is not the case for subjects in the humanities and social sciences, and even some branches of science. For instance, at the Kent Law School (University of Kent, UK), students are allowed to choose the titles of their essay questions and the title of at least one exam question, within a range of broad themes. This approach allows students to research aspects of the law that they are interested in at a level of complexity that suits them, and they are assessed on their research and critical ability. This type of assessment requires great flexibility on part of the professors. Flexibility is a necessary condition of personalized learning.

Abstract, diffused and codified content is what scientific knowledge is made of. It is undesirable to teach science without being located in the upper rear right hand region of the information space (Boisot, 1994). This said, the initiators of the educational revolution could imagine that a place could be found on the fringes of the learning experience for more local, uncodified and concrete forms of learning. This would give the student an understanding of different modes of information transmission, some of which are still prevalent in many cultures around the world.

Learning would be as much real-time as it is diffused, offering the student a rich experience in which he can apply theory to real-time situations. The evolution in learning technology means that commercially available educational Augmented Reality and Virtual Reality are just around the corner and it is not unforeseeable that soon, most students will be plunged into real-life situations from the comfort of their classroom. Devices will be used that transport learners virtually to situations that require the application of thinking different to the kind traditionally used in classroom situations. In many situations, this would add an IT-enhanced training dimension to an otherwise theoretical learning situation. The potential of this type of learning experience has been highlighted by Japanese authors Ikujiro Nonaka and Hirotaka Takeuchi in the Japanese business experience (Nonaka & Hirotaka, 1995). It is plausible and desirable for the benefits of 'tacit knowledge' to be transferred to the university context. As we have said before, the indicators of the ten dimensions are linked together. The real-time/asynchronous axis ties in very strongly with the three information space axes mentioned above.

The change to a more co-creative environment is going to be the most radical change that an educational institution wishing to embrace a new educational paradigm could undergo. As we have said, academic institutions prefer to trust in the best practice offered by subject matter experts. Without doing away with expert contribution in the learning process, educational institutions have the opportunity to ride on the Web 2.0 wave and give students the power to contribute to the global knowledge base through the use of Open Content, wikis and other user-generated knowledge creation tools. At a more local level, the students have a chance to work together and with experts to form a community where knowledge is not the sole property of the expert, it is co-created within the community. This requires a leap of faith; faith in our students, faculty and researchers, which would be balanced out by the ongoing contribution of experts. This type of environment would be very encouraging of cross-fertilization, which ties in with our second dimension on holistic education.

In the age of technology, the border between mediated and direct learning becomes blurred. If the end goal is to produce well-rounded individuals capable of flourishing in a work

environment, then too much emphasis has been placed on 'all online' forms of learning. Humans are social creatures, and although technology simulates human interaction better and better, the fact is that the all-online experience can have a dramatic backlash on the fabric of society. There are stories coming from South Korea of people going to extreme lengths to stay connected 100% of the time, forgetting that they are also flesh and blood and need sleep and food[7]. These are extreme cases, but Marina Zhang, a Chinese expert on the impact of the ICT revolution on Chinese society, writes 'Socialising online is a substitute for real-life social interaction for many Chinese youths, especially China's "little emperors" (the first generation of the single-child policy)' (Zhang, 2010). Many of these youths then risk growing up incapable of functioning in an organization that requires human contact. It is essential for a new educational paradigm to provide the learner with the ability to function effectively and flourish in both the online and offline worlds.

Finally, it has already been clear for years that the 21st Century requires people to learn throughout their lives. The university of the 21st Century is not a place where students go for three years, learn the subject matter of their degree, then leave, never to return. The duty of the new university is twofold: to give its students the ability to learn throughout their lives, and to provide them with opportunities to learn when they want to expand their knowledge base.

CONCLUSION

Not all the dimensions of the paradigm can be shifted at once, or the system could collapse under the weight of the change. Neither can the decision makers be certain of the optimal balance without first having feedback. This requires the system to have been tried, tested, and tried again until a balance point is reached. Finding the balance is therefore an iterative process, a trial and error system which evolves in response to feedback and results. Ignoring the coming revolution, however, will lead to the uncontrolled dismemberment of the system, as students world-wide voice their discontent and frustration with a system that does not provide them with the skills they need not just to earn a living, but to make a life for themselves.

[7] http://news.bbc.co.uk/1/hi/world/asia-pacific/2499957.stm and http://www.bbc.co.uk/news/10188394

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