Partnership for Higher Education Think Tank Conceptual Framework

Framing the issues, interventions and investigations of the Elearning Initiative

Image from The Matrix

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1 Introduction

1.1 Background

The Partnership for Higher Education in Africa's (PHEA) e-Learning Initiative intends to explore and demonstrate the ways in which educational technology can contribute to addressing teaching and learning challenges in Partner countries[1]. There have been numerous e-learning activities and investigations in Africa over the past decades funded by government, the private sector and grant-giving organisations. This Initiative is an attempt to build on that work in a coherent and co-ordinated manner. The PHEA commissioned a 'Think Tank'[2] to develop a conceptual framework which will provide the PHEA with strategic directions for support and grant making for projects and proposals involving the use of educational technology to address context specific challenges that contribute to improving the quality of learning and teaching in higher education institutions with particular focus on the partnership countries.

Think Tank members, including the PHEA funders, have participated in various discussions and workshops in order to develop a shared language and to deliberate key issues and debates in the field. The Think Tank has commissioned status reports on ICTs in higher education in the nine PHEA countries. These reports serve to contextualise educational technology issues and debates.

1.2 The conceptual framework

The aims of the conceptual framework are to:

- Provide a shared language to underpin the PHEA E-learning proposals, initiatives and projects. This shared language will hopefully facilitate communication between funders, practitioners and researchers in this emergent and little understood field.
- Locate current issues and debates in context in PHEA countries
- Identify the key areas and elements of learning activities, practices and research sites in Africa, and to map key relationships between those elements
- Indicate points of leverage for change using educational technology to address educational challenges

The issues, debates, key areas of practices and research and points of leverage are described in the Conceptual Framework in terms of five key *domains* (global, national, institutional, disciplinary, and teaching and learning). Each domain is expressed in terms of four *factors* (socio-economic; organizational; epistemological and pedagogical; technological)

1.2.a Domains

The domains scope areas of description and intervention, and locate debates, concerns, challenges and opportunities relating to ICTs in education. Domains are spheres or locations which can be connected in and overlap in different relationships. In some ways the domains are similar to levels (especially of intervention) although levels suggests an order, a value or a progression which domains should not suggest. While the domains are discrete, there is a certain amount of overlap between them.

[1] These countries are Egypt, Ghana, Kenya, Madagascar, Mozambique, Nigeria, South Africa, Tanzania and Uganda.

[2] The PHEA 'Think Tank' is a group of individuals with experience in educational technology and higher education teaching.

The *global domain* focuses on international trends; the potential impact of global trends on higher education; and on similarities and differences between the developing and developed world.

The *national domain* is scoped at the country level and focuses on the potential impact of national trends and policies on higher education practices and the particular nature of ICTs in education in the nine Partnership countries. The commissioned status reports on ICTs in higher education serve to further contextualise the debates and issues highlighted in this domain. The key actors in the national domain are provincial and national departments of education, parastatals and non-government organisations.

The *institutional domain* focuses on specific institutions and the ways that those institutions frame, enable and constrain the uptake and implementation of ICTs in education. The actors in the institutional domain are educational technologists, institutional service providers, middle managers such as Heads of Departments or top management such as Deans and other institutional managers and planners. The actors may also take the form of organisational groupings or structures.

The *disciplinary domain* acknowledges the importance of disciplinary research and knowledge communities in higher education as key to shaping, enabling and constraining academic practices. This domain focuses on the nature of disciplines and the potential influence on the use of ICTs in academic or subject disciplines.

The *teaching and learning domain* refers to all teaching and learning spaces including physical classrooms, informal learning spaces and environments, virtual classrooms or online learning environments in blended or distance contexts. The focus of learning could be formal within a higher education course, learning in informal contexts, learning within formal communities or learning within more informal communities. The actors in the teaching and learning domain are academics in their role as educators and students. Relationships include those between academics and students, and students and students.

1.2.b Factors

Factors are elements which are found to a greater or lesser extent within each domain. They are themes which cut across the five domains. The four factors (socio-economic; organisational; epistemological and pedagogical; technological) serve to cluster the key issues and debates within each domain.

Socio-economic factors refer to social, political and economic issues such as diversity in social class and gender, policy etc. which are relevant to ICTS in education.

Organisational factors refer to organisational forms, structures or dynamics that affect or are influenced by ICTs in education.

Epistemological and pedagogical factors refer to issues related to knowledge, teaching, learning and assessment and the relationships between teachers (academics) and students, as well as students and students.

Technological factors include for example technological trends and infrastructure which impact on the use ICTs in education.

1.2.c The matrix

The Conceptual Framework narrative which follows uses the domains (global, national, institutional, disciplinary, teaching and learning) as main headings. The factors form secondary headings. The domains together with the factors produce a matrix as shown below:

Factors

Domains

	Socio-economic	Organisational	Pedagogical & epistemological	Technological
Global				
National	Key issues and debates Possible investigations Possible interventions	Key issues and debates Possible investigations Possible intervention		
Institutional				
Disciplinary				
Teaching and learning				

This matrix therefore generates 20 cells in which the key issues and debates in the field can be located. At the end of each domain section possible investigations and interventions are identified and a completed matrix provides a summary of each domain.

Summary matrices of Issues, Interventions and Investigations are provided as alternative views in the conclusion.

The matrix is not a checklist, bur rather a map. It is intended to frame and locate discussion not to constrain it.

2 Global domain

2.1 Socio-economic factors

2.1.a The relationship between technology and society

Different views about the relationship between technology and society influence approaches to and activities using educational technology. Brey (2003) outlines three views of the relationship between technology and society:

- Society is technologically shaped: Technology shapes and transforms society. It affects social relations, organisational structures, beliefs, experiences and meanings. Based on this assumption about the relationship between technology and society, learning and teaching activities are driven by technological concerns.
- Technology is socially shaped: Technology is society made durable. Technological change analysed in terms of social negotiation. The meaning is not in the technology. For this view, pedagogy is central and drives the use of technology for teaching and learning.
- Technology and society are co-constructed: They are not separate structures or forces but are deeply inter-woven. For this view, technology is dialectically related to education. Learning is driven by educational goals and technology opens up new opportunities for learning and teaching activities. Change is not linear, but proceeds by variation and selection, meanings, functions and content are constantly open to negotiation (Brey, 2003).

These varied approaches to change in society and in higher education are reflected in policies which frame, enable and constrain the possibilities of elearning in higher education and in society broadly. It is therefore useful to make explicit the assumptions underpinning plans and activities as they impinge on the perceived roles of ICTs in education.

2.1.b Information society discourses and higher education

The dominant discourse of ICTs in society and in education is intimately connected with the twin themes of globalisation and innovation. This is expressed in the language of the information society and the networked society, often drawing on influential writers such as Castells and Carnoy. This discourse means that there is an implicit and generally accepted assumption of a consensus about ICTs in society as an automatic "good".

Elearning interventions take place in complex contexts responding to pressing and contradictory imperatives. Dominant discourses are challenged on the basis that acceptance of these key assumptions mean that other important issues (such as equity, gender etc) are rendered invisible or less important (Ravjee, 2006). There may be other policy and resource considerations (such as water, sanitation and heath) which need to be addressed before ICTs. The Bill and Melinda Gates Foundation, for example focuses "In developing countries…on improving health, reducing extreme poverty, and increasing access to technology in public libraries" (Bill and Melinda Gates Foundation website).

Education is increasingly viewed as a means for students not only to acquire knowledge but to develop the skills required for a rapidly changing society, changing technology and for lifelong learning (Futurelab report, 2006: 3). This view of education is influenced by transformation in collaboration and communication practices which shape and is shaped by globalisation and the 'information society' (New Horizon Report, 2007). Technology, as a key driver of the changing collaboration and communication practices, has a potentially major impact on higher education practices in general and learning and teaching practices in particular.

2.1.c The opening up of higher education

The opening up of higher education has occurred in response to reduced funding, increased mobility, massification and the commercialisation of higher education. The responses of universities are often enabled by ICTs, and have lead to the concept of borderless education. Borderless education is defined as education that cut across borders between types of education, the private/public sector and the not-for –profit education sector, country boundaries, sector boundaries e.g. between business and higher education, time and space boundaries e.g. online learning environments and e-universities (Middlehurst, 2002, p136).

There has been a dramatic increase in the number of mobile students[3] from 1.75 million in 1999 to 2.5 million in 2004. At the same time, countries such as the UK have observed a 5% drop in non-European Union higher education students, from 11% in 2003/4 to 6% in 2004/5. Sub-Saharan Africa has the highest outbound mobility ratio (mobile students from a given region as a percentage of tertiary students enrolled in that region) of 5.9% which is almost three times greater than the global average. A high outbound mobility could be indicative of poor educational provision in home countries and constitutes a brain-drain for the home country (UNESCO 1996: p37).

Borderless education also includes the internationalisation[4] of institutions as a means of opening up new markets of students (Middlehurst, 2002). ICTs play a significant role in the internationalisation of education by providing access to support services and academic programmes.

Traditional institutions face competition from new institutional forms (e.g. corporate institutions or the 'for profit' institutions) arising out of the borderless education context. ICTs specifically enable the possibility of "virtual universities", through distance students all over the world, and there has been an increase in distance education (New Horizon Report, 2007). Limited infrastructure in developing countries may continue to constrain such initiatives (see *New Kinds of Institutions*, following). Access to ICTs may well be a factor for students who have more choices than previously.

2.1.d ICTs and development

ICTs are generally considered essential for economic development. It is claimed that ICTs have the potential to transform the economy of developing countries (Crafts 2003). On the other hand, the argument is made that although there is sufficient evidence of a correlation between ICTs and economic development in the developed world, very little evidence for this relationship exists for the developing world (Ngwenyama et al. 2006). However, many African governments have prioritised initiatives (such as NEPAD) to develop ICT infrastructure. Despite the challenges, available technologies are being used in interesting and innovative ways in Africa (Ng'ambi, 2006).

The ICT and development discourse, is based on a dichotomy "set up between those countries that are defined as developed and those that are developing, which is then extended to produce a category of people called the 'information-poor'. This dichotomy fits neatly into a model of development based on automatic and unproblematic catch-up, leapfrogging, and progress to the ideal represented by the developed countries. The model of development is

[3] The UNESCO report (2006: p33) defines 'mobile students' as those who study in foreign countries where they are not permanent residents. This definition differs from the traditional conception of 'foreign students' which is generally based on citizenship.

[4] The process of internationalisation has been achieved by merely recruiting foreign students to a particular institution, offering students a choice of programmes of study from a foreign institution while still based at the home institution, providing students with options to combine courses from home and foreign institutions for degree purposes, establishing off-shore campuses and creating international programmes of study (Middlehurst, 2002: p137 -144) . Thus, for example, an Australian university, Monash, has a campus in South Africa, a Malaysian university, Limkokwing, has a campus in London.

grounded in assumptions of technological determinism - assumptions that ICTs are a magic development solution - and this allows the complex political factors influencing poverty and inequality at local, national and international levels to be hidden, or at least to go largely unquestioned" (Wilson, 2003).

2.2 Organisational factors

2.2.a Growth in student enrolment in higher education

Globally student enrolment increased from 68 million in 1991 to 132 million in 2004 (94.1%) while in sub-Saharan Africa student enrolment increased from 7 million to 15 million (114.3%) in the same time period[5]. Although the percentage increase for sub-Saharan Africa is greater than the global percentage increase in tertiary student enrolment, disparities between developed and developing regions remain. In North America and Western Europe 69% of adults of tertiary age are enrolled in a tertiary institution while 5% are enrolled in sub-Saharan Africa and 10% in South and West Asia (UNESCO, 2006: p21).

The annual global growth rate for tertiary enrolment is 5.1% while sub-Saharan Africa had one of the highest regional growth rates (7.2%) for the period 1991 to 2004. However, the tertiary gross enrolment rates (GER), which is the ratio of the number of students to the number of tertiary school age-population, is the lowest and has changed very little (from 3% in 1991 to 5% in 2004) over the period due to high rates of population growth. (UNESCO, 2006: p22-23)

Increases in student numbers place financial pressure on the higher education sector which is facing increasing costs and shrinking budgets (New Horizon Report, 2007). Not only are there more students, but there are different kinds of students. There is an increase in the number of working and commuting students. These students place pressure on higher education institutions to offer more flexible modes of higher education provision (New Horizon Report, 2007).

Due to increasing student numbers, higher education institutions face pressures of greater student diversity in terms of home background, schooling background and language. Educational technology offers strategies for supporting diversity and its educational challenges (*see* Jaffer, Ngambi and Czerniewicz 2007).

2.2.b New kinds of higher education institutions

As higher education opens up, the nature and role of higher education institutions themselves are changing.

There is a growth in private higher education institutions. Higher education institutions now have to compete with private institutions (Horizon Report. 2007). Although globally tertiary education provision is still predominantly public, private tertiary institutions are playing a bigger role in Latin America (except the Caribbean), East Asia (except the Pacific) and to a lesser extent in sub-Saharan Africa (UNESCO, 2006: p30).

There are also more higher education private/public partnerships. An example of the provision of online higher education is *eDegree* which operates internationally through partnerships with local universities. Such arrangements are indicative of the kinds of choices that institutions are making, with some choosing to outsource parts of their elearning initiatives. Whether elearning per se can be separated from core learning and teaching activities in a university is a debatable point, however.

[5] Conflicting reports on higher education enrolment is evident. The New Horizon report states that student enrolment is declining. However, this report does not provide any supporting evidence.

The private sector is also a player in elearning initiatives e.g. Microsoft partnering with Blackboard (online learning environment software). The role of the private sector in shaping and influencing the growth of elearning is insufficiently addressed in the literature to date.

New institutional forms are being enabled by ICTs. An example of this is the African Virtual University (AVU), a full scale digital university comprising 30 higher education institutions from 17 African countries. Just a few years ago, confident predictions asserted the rise of trans-national virtual universities, yet the AVU itself has changed considerably from its original vision and high profile initiatives such as the United Kingdom E-University have been unsuccessful and closed[6].

2.2.c The rise of new structures relevant to higher education

There is a growth of global structures in the form of both formal organisations and informal networks focusing on information and communication technologies in ways that intersect with higher education. iCommons, for example, is "an organisation with a broad vision to develop a united global commons front by collaborating with open education, access to knowledge, free software, open access publishing and free culture communities around the world" (http://icommons.org/static/about). Another example is the Sakai Consortium which is a global open source community made up of countries throughout the world working together on higher education teaching, learning and collaboration online environments[7].

2.3 Pedagogical and epistemological factors

2.3.a Changing knowledge, colonised knowledge

There is a concern that local knowledge in a globalised world is subsumed in dominant knowledge structures.

Another assertion is that the structure of knowledge is changing from knowledge organised into classified disciplines to a more fluid organisation of knowledge based on personal needs that are significant at different times and in different places (Social Software Report, 2006). Although we are seeing the emergence of new disciplines and new fields which are trans –disciplinary, multi-disciplinary or inter-disciplinary, claims about the reorganisation of knowledge or the demise of disciplinary knowledge boundaries require investigation.

2.3.b Social practices - implications for learning

The rise of new social practices enabled by ICTs is extensively noted. In particular Web 2.0 is said to have given rise to the "read-write" web, and a new generation who both use and contribute to the online world or the Internet. They are described as producers, no longer consumers.

Web 2.0 is referred to as a social revolution rather than a technological one; "an attitude not a technology. …technically open … but …, more importantly, socially open, with rights granted to use the content in new and exciting contexts" (quoted in Downes 2004).

The emphasis is on the ways that ICTs are used to enable collaboration. Competence is attained from connectivism (Siemens[8]), learning is distributed, barriers are broken down

[6] Opened in 2003 after development costs of £62 million, the institution was closed in 2004, with an analyst suggesting the problems were: timing, focus, branding, platform investment and impatience (Garret, 2004).
[7] While largely US and European institutions, the community includes institutions from South Africa, Brazil, Venezuala, Mexico, Egypt, Australia, China and Japan.
[8] George Siemens, who devised this theory, says that connectivism is the integration of principles explored by chaos, network, and complexity and self-organization theories. Siemens, G 2004 Connectivism, a learning theory for the digital age, in ElearnSpace

across communities. Producers no longer require experts as intermediaries but can communicate directly with one another. Formal peer review processes may be considered unnecessary and replaced with shared content creation spaces such as Wikipedia (text), Flickr (photos) and Del.icio.us (references). The knowledge of crowds is enabled allowing the contribution of more contributors and challenging the knowledge of the individual, especially individual experts.

The most extreme perspective on these trends is that they mean that formal teaching and learning structures such as courses, or even institutions are no longer required. Instead communities and conversations create knowledge and structure learning in flexible ways. Content and learning become truly student-centred (*see* Stephen Downes and related authors at www.downes.ca).

2.3.c The rise of the NetGeneration

New ICT-mediated social practices are specially considered the domain of the younger generation who have grown up with technology, and are referred to as the NetGeneration or Digital Natives. Based on observations of young people's use of ICTs in everyday settings, claims are made about their learning styles and thinking patterns. Young people are said to prefer discovery learning (Brown, 2000). Digital Natives are said to be used to rapid influx of information, multi-tasking, processing and accessing multi-modal information often linked through hypertext (Prensky, 2001).

It is asserted that the use of ICTs is changing the way young people think and learn. '[T]oday's kids are always "multiprocessing" – they do several things simultaneously – listen to music, talk on the cell phone, and use the computer, all at the same time.' "Literacy today involves not only text, but also image and screen literacy. The ability to "read" multimedia texts and to feel comfortable with new, multi-media genres is decidedly non-trivial' (Brown, 2002). The claims made about the learning styles of 'digital natives' require further research.

'Netgen' students or 'digital natives' are treated as homogenous. Differences in age, socio-economic status, cultural background or gender etc are not taken into account (Maton et al., 2007).

2.3.d The relationship between Web 2.0 and higher education

There is a fine balance to be attained between social practice and classroom practices. Some researchers argue that curriculum activities should not be contrived by attempting to accommodate new technologies or technology-mediated social practices into classroom practices. At the same time they note that the gap between school and everyday practice should not widen too much (Lankshear & Knobel, 2003).

One perspective is that social practices are being brought organically into higher education by students. There are numerous claims that transference from social practice of using technology to education is occurring (Social software report, 2006). It is claimed that students themselves are adapting their learning practices on the basis of their changed social practices.

This has lead to the assertion that educational planners and designers should be changing the way that education itself is structured in order to attract , engage and accommodate the new generation of young people. New technologies such as social software are seen to offer significant potential for the development of new approaches to education. Researchers studying games argue that practices benefits of online games should be replicated in educational settings, for example.

It seems that ICTs be integrated into the pedagogical and epistemological layers of higher education at different levels. At one level there is evidence of increased take up. "..at the

level of fine-grained *instructional practices* – the actions that teachers engage in as they teach – then the literature is full of new ideas and developments. University teachers now employ podcasts, chat rooms, bulletin boards, automated recordings systems, machine-driven assessment, and the like. The teaching activities of teachers and the learning experiences of students seem now to be more technology-supported than before" (Mhlanga and Moll 2007 p.2).

However, it is also noted that that information literacy should not be accepted as a given even among 'netgen' students (New Horizon Report, 2006) and there are those who argue that the claim that technology skills and practices of young people ('net gen' students or 'digital natives') are directly transferable to education is largely anecdotal.

An argument is also made that everyday knowledge in social settings is not the same as academic knowledge, and is structured differently (Maton, Bennet & Kervin, 2007).[9] Therefore the transference of everyday ICT-mediated social practices to the academic environment for academic purposes needs to be investigated.

The questions therefore are:

- Are young people transferring new ICT-mediated practices into higher education?
- How relevant are new ICT-mediated practices to the fundamental role/s of higher education?
- Should higher education practices be changing to accommodate new practices?

There are indications that even students with extensive ICT- mediated social practices do not transfer those practices to the classroom and that it may not be appropriate to do so (Lankshear & Knobel, 2003). In their ethnographic study of liberal arts college students, US researchers found that students' technology practices in the classroom differed from their practices outside the classroom (Lohnes & Kinzer 2007). While students exhibited the tendencies of Netgen students in their dormitory, they resisted the use of technology in the classroom. In particular, students found that the use of laptops in the classroom created physical barriers and prevented the development of a student community.

It is noted that "the main concerns in teaching and learning in higher education remain those of how to formulate curricula, develop deep analytic learning skills in students, cover appropriate disciplinary content, and put in place formative assessment practices" and that these are currently fundamentally unaltered by ICTs (Mhlanga and Moll 2007). Thus, even in cases where new ICT supported strategies are utilised, assessment of tasks in new forms of work (e.g. blogs, podcasts, videos) is still a challenge (New Horizon Report, 2007).

2.3.e Open educational resources

Due to increasing costs, commercialisation and privatisation of education, Open Educational Resources (OERs) have emerged as a fair and accessible alternative. OER collections and repositories are intended to provide students and educators with centralised access to educational materials, enable educators to reuse and adapt resources, share these adapted materials with others through open access repositories and create opportunities for the collaborative development of new OERs globally across several disciplines.

[9] For Bernstein (1996) everyday knowledge (horizontal discourse) is distinct from academic knowledge (vertical discourse) both in form and mode of acquisition. Everyday knowledge is context dependent and is segmentally organised whereas academic knowledge is context independent and hierarchically organised. Furthermore, everyday knowledge is acquired socially through interaction and engagement with family and peers. In contrast, academic knowledge is selected and sequenced for transmission and acquisition within academic settings with clear curriculum trajectories.

The jury is out on how much of this vision has been achieved. Recent research illustrates that while educators are accessing and using OERs, they are less likely to share their own content, reuse other content and create content collaboratively (Petrides & Jimes, 2006). Other constraints on OERs were identified in UNESCO's International Institute for Educational Planning (IIEP) discussion forum held in 2005 (Stacey, 1996?).[10]

OERs are seen to alleviate the dearth of educational resources, increase access to resources , enable democratisation and serve disadvantaged sections of society (Stacey,1996?).). There is a danger that OERS may work to the advantage of the developed world rather than the developing world, and may become a form of cultural imperialism. It has been argued that OER as a transformative mechanism may be undermined, as OERs produced in the developed world for use in the developing world will have very little effect on improving education in the developing world. Indeed it enables capacity and systems development in the developed world rather than in the developing world because funding for OERs is secured by developed world OER producers (Butcher, 2007).

2.4 Technological factors

2.4.a Trends reported from developed countries

Current reported technological trends relevant to higher education include the rise of social software, a shift to multimodalities and an increased expectation of customisation. Such trends are especially prevalent in predictors from developed countries:

- Dynamic knowledge creation and social computing (web 2.0 software) are said to be becoming more available and more widely used (New Horizon Report, 2006). Social software enables communication between many people, gathering, sharing and creating content, collaborative collecting and indexing of information, social networking, personal broadcasting and translation between different platforms as is appropriate to creator, recipient and the context (Futurelab report 2006).
- It is claimed that here is a shift in communicating from text only to the use of other modalities including audio, video and spatial modes (Social software report, 2006).
- There is greater expectation of individualised services and tools and access to information (New Horizon Report, 2006).

For developing countries, such trends are constrained by limited bandwidth. However, related context-specific practices arise, (for example of the use of online chat via cell phones which are increasingly widely available in developing countries). The danger of ignoring such trends in developing countries is that the divides may be further entrenched rather than ameliorated.

2.4.b The rise of mobile platforms

Mobile technology is increasingly viewed and used as a delivery platform internationally (New Horizon Report, 2006). Mobile telephone subscribers increased from 46 to 258 per 1000 people from 2000 to 2005, constituting 63% of the world's mobile subscribers (New Horizon Report, 2006: p5).

In sub-Saharan Africa the number of mobile subscribers increased from 32 to 103 per 1000 people (an increase of 221.9%) from 2000 to 2005 while internet users increased from 5 to 15 subscribers per 1000 people from 2000 to 2005 (World Bank Global trends and policies, 2006). This rapid growth in the mobile technology market compared to internet usage points

[10] These have been identified as: i) The reuse of OER content is difficult in online learning environments because OERs are often locked by the software hosted by the creator of the OER. ii) Countries without basic ICT infrastructure or limited bandwidth are constrained in the use of OERs. iii) Although many OERs have translation partners, globally OERs are dominated by English thus affecting the use of OERs in non-English speaking countries and iv) Contextualising OERs to make them locally relevant remains an issue.

to potential developments in the use of mobile technology for educational purposes (Ng'ambi 2006).

2.4.c The digital divide

The 'digital divide' has been traditionally described in relation to access to modern information technology such as fixed line telephones, mobile telephones and the internet. Although the digital divide in this sense is shrinking, a crucial gap still exists (World Summit on the Information Society website).

Firstly, The International Telecommunication Union (ITU) estimated in 2004 'that some 800 000 villages – representing around one billion people worldwide – still lack connection to any kind of information and communication technology' (World Summit on the Information Society website).

Secondly, a second generation of the digital divide is emerging in terms of access to bandwidth since limited access to bandwidth restricts access to information and communication (especially regarding social software).

2.5 Interventions and investigations

Having described the issues and debates, this section considers how these concerns and challenges in the global domain can be addressed, and how opportunities can be exploited. It provides suggestions in answer to the question, What can be done? This is done in two ways by considering potential interventions, which may be considered development initiatives and potential investigations which suggest possible research questions. Ideally such projects would contain both development and research dimensions.

2.5.a Possible interventions

Numerous projects exist which could address the issues described above. At the most general level, these include

- Innovative uses of current software for educational purposes (including social software and pervasive technologies and software)
- Assessment tasks based on social software for use in a variety of contexts.
- Learning activities and resources using mobile technology
- ICT-mediated interventions which address specific learning problems
- ICT-mediated interventions which address the needs of particular groups of students
- Support for initiatives which improve access (in the most complex sense of the word)
- Support for initiatives designed to overcome the digital divide
- Support for blended learning, and for distance students
- Enabling private-public partnerships to the advantage of public education imperatives
- Creation of an enabling environment for elearning

2.5.b Possible investigation

Sceptics point to the lack of empirical evidence to dismiss the impact of ICTs on and implications for education while evangelists emphasise the potential significance and implications of ICTs for education. Neither the sceptic view nor the hype view is useful in enabling a more informed understanding of ICTs in education. What is needed is empirically based and theoretically informed research.

Research projects may consider questions such as:

- What technological skills do young people have?
- Are the 'digital natives' a distinct generation? If so, what are the distinctive characteristics and skills they posses?

- Are the characteristics of digital natives in particular countries e.g. in Sub-Saharan Africa in any way distinct from those of digital natives in other regions?
- What are young people's use of technology, their experience and their preferences in both everyday practice and academic practice? (Maton, Bennet & Kervin, 2007)
- To what extent are the technological skills acquired by students in everyday practice transferable to education? (Maton, Bennet & Kervin, 2007)
- What are teachers' experiences and perceptions, including their assumptions about the role of technology in education? (Maton, Bennet & Kervin, 2007)
- What are teachers' assessments of student's skill with technology? (Maton, Bennet & Kervin, 2007)
- How do we respond to the needs of an information society (new life choices and new employment patterns)? How should education respond to the change and what is the role of ICTs in the envisaged world? (Social software report, 2006).
- Are young people transferring new ICT-mediated practices into higher education?
- Should higher education practices be changing to accommodate new practices?
- How relevant are new ICT-mediated practices to the fundamental role/s of higher education?

2.6 In summary

The Global Domain is summarised in the matrix following.

The Global Domain	Socio-economic factors	Organisational factors	Pedagogical & epistemological factors	Technological factors
	Issues and debates			
	Relationship between technology and society Information society discourses and higher education The opening up of higher education ICTs and development	Growth in student enrolment in higher education New kinds of higher education institutions The rise of new organisations relevant to higher education	New social and learning practices The rise of the NetGeneration The relationship between web 2.0 and higher education	Changing knowledge, colonised knowledge Trends reported from developed countries The rise of mobile platforms The digital divide
	Interventions			
	Support for initiatives designed to overcome the digital divide Enabling private-public partnerships to the advantage of public education imperatives Initiatives for borderless HE	CT-mediated interventions which address the needs of particular groups of student Support for initiatives which improve access Creation of an enabling environment for elearning	Teaching and learning tasks based on social software ICT-mediated interventions which address specific Higher Education problems	Uses of current software for educational purposes Learning activities and resources using mobile technology
	Investigations			
	NetGen in different contexts?	The role of HE in the information society?	Are there new ICT mediated practices and what do they look like? Graduate competencies?	Comparative trends and patterns of ICT access and use?

3 National domain

3.1 Socio-economic factors

3.1.a National elearning policy frameworks

While many developed countries have specific e-learning policies, frameworks, regulations and funding bodies, these are rare in developing countries. The PHEA countries do not have specific national policies devoted to e-learning, although education is mentioned in national ICT policies. PHEA country ICT policies refer to education as follows:

- Egypt's 1999 National ICT Plan was revised in 2005 to ensure that ICTs are integrated into education and training at all levels (Egypt Country Report).
- Ghana's Ministry of Education, Youth and Sport (MOEYS) plans to develop long and mediun term programmes for the introduction and implementation of ICTs in education (Ghana Country report). The provision of sufficient ICT resources is one of the strategies of MOEYS in the national ICT in Education drive (Ghana Country report).
- The Kenyan National ICT policy (2006) focuses on economic development in a number of sectors as well the growth and implementation of elearning at all levels of education. (Kenya Country Report).
- Mozambique's National ICT policy developed by Mozambique's National ICT Policy Commission, addresses all aspects of Mozambican society including higher education (Mozambique country report).
- The Nigerian Information and Communication Technology agency produced a National Policy on Information Technology (USE IT) in 2001 with Higher Education being one of the target sectors.
- While South Africa has a policy White paper on e-education (2004) for the implementing ICTs in schools, no specific elearning framework exists for Higher education (South African Country Report).
- The Tanzanian National ICT policy (2003) prioritises health, government and the education sectors (Tanzanian Country report).

The lack of a specific policy can be enabling in that there are no preconceived notions or fixed indicators to constrain innovation on the ground. But it can mean that take up and innovation are uneven, with well resourced institutions advantaged in several ways. Lack of a national policy may also suggest that governments do not specifically value elearning. And of course without a specific policy there is less likelihood of national resources being channeled into elearning, let alone driving it.

A further complication is that in many countries, at a national policy level ICTs in education are often conflated with distance education, rather than being conceptualized as integral to face to face or residential education.

3.1.b ICTs in national Policies

Discourses of the information society and ICTs as a "good" are reflected in national policies for higher education, national human resources development, economic development as well as in media and broadcasting policies.

National policies and initiatives indicate an express commitment to reducing the digital divide both within countries and between developed and developing countries.

The use of ICTs for teaching and learning as a national development priority is reflected in terms of budgetary allocation for ICT infrastructure. Given resource limitations this may be at the cost of other social needs (Ravjee, 2006). Poor economies in most African countries

militate against the allocation of resources for the development and maintenance of national ICT infrastructure. Conflicting imperatives and competing needs for the allocation of limited resources make decisions about educational technology in higher education and broader society particularly difficult.

There is an expectation by governments that higher education is preparing graduates for participating in a global information society which individual countries becoming part of. Unlike in many developed countries these graduate competencies are not made explicit nor measured through specific indicators.

While global imperatives are powerful and may contradict national interests, local responses reflect complex contextual realities and responses, which may be impediments to change, as noted by Cross and Adams (2007) in the South African context.

3.1.c ICTs and social divides

Social class remains a significant factor in determining access to ICTs and therefore in preserving the digital divide (Social software report, 2006). The literature (Liff & Shephed, 2004; Montagnier & van Welsum, 2006; Sandhu et al, 2001) points to new digital divides emerging out of existing social divisions based on class, gender, nationality and disability. These divides restrict access to and participation in higher education and therefore lead to the continued exclusion and under-representation of historically excluded groups in ICT fields (Czerniewicz, Ravjee, Mlitwa, 2006: p57).

The challenge facing national governments is to develop policies and implementation strategies that focus on addressing social inequalities thus enabling greater higher education access and participation. How can ICTs be used, for example, to support lifelong learning and increase access to higher education in unequal conditions, e.g. between rural and urban groups?

With regards gender, contradictory evidence on gender digital divide is found in the literature. While some studies from developed countries claim that the gender digital divide no longer exists (Sax et al 2001), that it is closing (Raban, 2002) or that the differences have become more subtle (Livingstone, 2005), others claim that the divide is still very much in existence (Liff & Shephed, 2004; Montagnier & van Welsum, 2006)[11].

Very few studies on the gender digital divide have been undertaken in developing countries, especially in higher education. A study by the Link Centre based on 2004 and 2005 data of 10 African countries showed that in less developed African countries and contexts (i.e. rural settings) mobile phones, computers and the internet were used predominantly by men. In more economically developed countries like Botswana, Namibia and South Africa the gender splits were mostly equitable in terms of uses of mobile phone but more men than women had email addresses (around a 60:40 split). A recent Ugandan higher education study concludes that physical access and skills are not enough to ensure women's empowerment, and that obstacles largely emanate from patriarchal institutionalized work and programmatic ethics, limited physical facilities as well as individual characteristics, perceptions and attitudes (Madanda, A; Kabonesa, C et al., 2007). And a South Africa study noted that while male and female staff and students had the same access to technological resources, differences in autonomy between male and females were apparent (Czerniewicz & Brown, 2006) .

With regards disability, in developed countries, ICTs are considered an opportunity to increase access to disabled students. Countries such as the UK legislate accessibility for

[11] Differences could be attributed to the fact that these claims are all based on self-reported data and define the gender digital divide differently. Definitions of the divide include access to ICTs, use of ICTs, attitudes towards ICTs or participation in ICT relate occupations.

various disabled groups into ICT access and learning design. Such opportunities have not been incorporated into policies in most developing countries.

3.1.d Intellectual property

National Intellectual Property Rights legislation has not kept pace with changes in content production and dissemination enabled by ICTs. Copyright legislation has generally not been updated to include provision for electronic media. In particular, there is no provision for such issues as fair dealing in the digital environment, a situation aggravated by inadequacies in the provision for print media; nor for the status of transient copies, an important issue when it comes to providing online courseware. As a result of such inadequacies, providers of online resources are faced with unwieldy and impracticable provisions for the management of IPR in online course materials.

3.2 Organisational factors

3.2.a ICTs in and across national structures

Higher education is normally a national rather than a provincial responsibility. In some cases, higher education may not fall under the auspices of the national department of education, and may therefore be delinked from schooling. Mozambique, for example, has a Ministry of Higher Education, Science and Technology, Tanzania a Ministry of Science and Technology and Higher Education, and Egypt has a separate government ministry for Higher Education. Different locations are likely to mean different priorities and different challenges.

Elearning is enabled and constrained by policies emanating from a number of different ministries: there is generally a lack of co-ordination between policies emanating from these sectors, such as Education, Labour, and Science and Technology. This leads to conflicting principles at times (with regard, for example, state commitment to open source software) or to key issues falling between the cracks between the various ministries. In Uganda for example, overall government policy encourages development of software locally, in order to create a 'vibrant' national ICT sector (Ministry of Transport and communication, 2003). Yet at the same time the government has invited major proprietary software companies like Microsoft into schools (Kikwete, J. 2006).

The challenge for national governments is not only to develop national educational technology policy but also to ensure articulation between policy and implementation where relevant policies exist.

3.2.b On – off campus access

While top-down state-driven ICT in education transformation as the main driver can be problematic if it is the key force for change, equally change that arises from bottom up activities alone is a problem as it can perpetuate inequalities. Historically well-resourced higher education institutions or those with closer relationships with grant-giving organizations are likely to be advantaged in several ways (such as infrastructure, human capital, social networks) thus entrenching digital and ICT usage divides.

The disjuncture between relevant state policies leads to a similar disjuncture in relevant state structures and regulatory frameworks. The extent to which ICT infrastructure and elearning is factored into national governance structures reflects whether the use of ICTs for teaching and learning is considered a national development priority. National ICT policy, research and development bodies drive and shape the thinking about ICTs for teaching and learning.

Nationally funded telecentres and ICTs based in community centres are considered an opportunity to extend access to education and provide outreach centres for students to gain practical experience while studying (Colle, 2005). Telecentres may be difficult to sustain.

Higher education institutions could provide resources required by telecentres such as research in to the ICT needs of the community the telecentre serves and training of telecentre staff (Colle, 2005).

3.3 Pedagogical factors

At a national level, educational and other policies frame and shape the possibilities of pedagogical practices by encouraging, supporting and resourcing on the ground activities and choices. Policies and national activities which are relevant to pedagogy include the following:

- Elearning policies, where they exist, policies shape thinking about and drive implementation of ICTs for teaching and learning.
- Curriculum frameworks may support the integration of ICTs into higher education curricula. Omission of elearning as part of curriculum possibilities may reveal negative views, or ignorance regarding the ways that ICTs can support curriculum objectives.
- Teaching and learning quality assurance mechanisms and frameworks can be essential in ensuring the quality of the integration of ICTs into higher education curricula[12].
- National institutional audits can play a role in acknowledging elearning activities as being part of and adding value to higher education business.

The lack of co-ordinated national policies, frameworks and quality assurance processes with regards elearning could result in contradictory or conflicting decisions being made at institutional level.

3.4 Technological factors

3.4.a An enabling national infrastructure

The uptake of ICTs by higher education institutions for administrative and pedagogical functions is to a large extent dependent on how enabling the national environment is, particularly in terms of the availability of national telecommunications and ICT infrastructure. This is particularly relevant in the developing world (Shabani, 2007).

While e-commerce and general e-readiness issues are often addressed at a national technological planning level, the specific needs of Higher Education often do not receive specific attention. With the exception of Mozambique, higher educations have not been involved in national ICT planning. In South Africa, the Tertiary Education Network (TENET) has played a major role in liaising with national ICT organisations and services providers and higher education institutions.

3.4.b Uneven infrastructure: quantity and quality

Indicators of the state of ICT infrastructure include internet bandwidth, the number of available telephone lines and wireless coverage. The table below shows data[13] selected from the World Bank report on ICTs for Development (2006) for the nine Partnership for Higher Education (PHEA) countries. Data from two 'high income' countries, the United Kingdom (UK) and the United States (US), provide a comparison.

Country	Telephone main lines (per 1000 people)	International internet bandwidth (bits per person)
Ghana (Low income)	15	1
Kenya (Low income)	10	2
Madagascar (Low income)	3	0

[12] See SAIDE report (2006) on the debate regarding whether elearning quality assurance processes should be separate from or integrated with general teaching and learning mechanisms.
[13] The data reported in the World Bank report on ICTs and development (2006) is based on 2004 data sources.

Mozambique (Low income)	4	1
Nigeria (Low income)	8	1
Tanzania (Low income)	4	0
Uganda (Low income)	3	3
Egypt (Low middle income)	138	23
South Africa (Low middle income)	104	29
UK (High income)	567	13156
US (High income)	606	3308

The table clearly shows the gap between low income countries and lower middle income countries and the enormous gap between low income countries and high income countries with respect to the number of telephone main lines and bandwidth per person. For example, The US has approximately 40 times more telephone main lines per 1000 people than Ghana and approximately 6 times more telephone main lines per 1000 people than South Africa. The UK has approximately 13 000 times more bandwidth (in bits) per person than Ghana, Mozambique and Nigeria.

While the data provides a comparison of the available ICT infrastructure, it tells you little about the quality. For example, while Nigeria has more telephone main lines per 1000 people than Madagascar, Mozambique, Tanzania and Uganda, it is the most restricted of all of the Partnership countries in terms of ICT infrastructure (PHEA website).

3.4.c Bandwidth

A country's bandwidth capacity impacts on the capacity available to higher education institutions for administrative as well as educational purposes. Bandwidth capacity of developing countries is significantly weaker than those of developed countries. The total capacity of internet bandwidth in Megabits per second ranges from 25.0 for Ghana to 881.5 for South Africa, while the US is 970953.0 (ITU, 2005 The internet of things)[14]

Besides bandwidth capacity, the cost of international bandwidth is often a major constraint for developing countries which often have to pay the full cost of a link to a hub in a developed country (PHEA website). The cost of bandwidth differs significantly from high income countries to low income countries. For example, high speed broadband costs 2 448 US dollars per month in Mozambique, 5 7 60 US dollars per month in Uganda, 127.47 US dollars per month in South Africa, 42.38 US dollars per month in the UK and 20 US dollars per month in the United States (ITU, 2005 Internet of things).

If speed of the broadband is compared for these countries, the differences between the cost of broad band becomes more glaring. For the prices quoted above, the speed for broad band is 512 kilobits per second for Mozambique and Uganda, 1 Megabyte per second in South Africa, 2 Megabytes per second in the UK and 4 Megabytes per second in the United States (ITU, 2005 Internet of things). This means that the cost of bandwidth in Uganda is 288 times more expensive than the US for speed of bandwidth which is 8 times slower than the US.

Bandwidth access and cost are related to a lack of competition in the provision of international and national broadband infrastructure and limited national monopolised infrastructure. Negotiations between higher educations institutions and Internet service providers are weak and the power of joint negotiations for improved access and costs is almost absent amongst African higher education institutions (PHEA website).[15]

[14] Total capacity of internet bandwidth (in Megabits per second)for PHEA countries: 25.0 for Ghana, 34.0 for Kenya, 34.0 for Madagascar, 18.5 for Mozambique, 155.0 for Nigeria, 16 for Tanzania, 60.5 Megabits per second for Uganda, 1 412 for Egypt, 881.5 for South Africa, 781553.5 for the UK and 970953.0 for the US (ITU, 2005 The internet of things).

[15] South Africa is an exception in that the Tertiary Education Network (TENET) has played a major role as broker between national ICT organisations and services providers and higher education institutions (Tenet website).

3.5 Interventions and investigations

Having described the issues and debates, this section considers how these concerns and challenges in the national domain can be addressed. It provides possible answers to the question, What can be done? This is done in two ways by considering potential interventions, which may be considered development initiatives and potential investigations which suggest possible research questions. Ideally such projects would contain both development and research dimensions.

3.5.a Possible interventions

Numerous projects exist which could address the issues described above. At the most general level, these include

- The development of national infrastructure that supports the use of ICTs for teaching and learning in higher education institutions.
- The development of national elearning policies and curriculum frameworks.
- The integration of elearning into existing national curriculum frameworks
- The development of national quality assurance mechanisms and frameworks
- The integration of elearning into existing national quality assurance mechanisms and frameworks
- Support for national initiatives to enable audio and podcasting for blind students using widely available mobile devices (especially cell phones) provide opportunities in developing countries

3.5.b Possible investigation

Research projects may consider questions such as:

- What national patterns are there in relation to higher education students'and staff access to and use of ICTs?
- How effective are national support structures and systems in facilitating the uptake and integration of ICTs for teaching and learning in higher education institutions?
- How can ICTs be used to increase access to higher education equitably in developing countries?
- How can ICTs be used to improve accessibility for disabled students in developing countries?
- What is the role of the state in supporting change in ICTs in higher education at institutional level

3.6 In summary

The national domain is summarised in the matrix as illustrated below.

The National Domain	Socio-economic factors	Organisational factors	Pedagogical & epistemological factors	Technological factors
	Issues and debates			
	National elearning policy frameworks ICTs in / across national policies Social divides Intellectual Property	On – off campus access ICTs in / across national structures	National curriculum frameworks National Quality Assurance frameworks Elearning quality assurance	An enabling national infrastructure Uneven infrastructure-quantity & quality Bandwidth
	Interventions			
	Policy development & integration Addressing policy issues & disjunctures National IPR initiatives	Interventions in specific ICT mediated areas e.g. disability, support Addressing off / on campus divides	QA development & integration Curriculum development and review Elearning policies & curriculum frameworks	ICT infrastructure development Equalising infrastructure Bandwidth initiatives
	Investigations			
	Role of state policy to enable & constrain institutional ICT use Role of ICTs in providing access to HE	Effectiveness of enabling national structures?	National patterns of access & use	

4 Institutional Domain

4.1 Socio-economic factors

4.1.a An enabling environment

Research has found that systematic institutional take up of ICTs is enabled by national policies which encourage use of ICTs; funding bodies which resource such use and quality assurance mechanisms which monitor and require reporting of such use (White, 2007).

In developed countries, public higher education is operating with less government support than previously. The survey done by the Higher Education Statistics Agency in 2001 shows that UK universities have had to deal with severe cut backs in government support, that the overall financial position for UK universities is worsening and the gap between better financed institutions and less successful institutions was increasing (Taking the higher education pulse, May 2003). At the same time there is significant state funding available specifically for elearning thus funding is a driver. US institutions also face increasing student enrolments in a context of decreasing state funding, and institutions have increased tuition fees and sought corporate funding (Lee & Clery, 2004).

Most African higher education institutions are struggling economically. Higher education has been largely dependent on governments. The struggling economies particularly of sub-Saharan African countries and political instability have impacted seriously on higher educatiion institutions' finances (Johnstone, 2004). Institutions therefore have difficulty in allocating sufficient budget for the maintenance of ICT infrastructure and systems to support the use of ICTs for teaching and learning, especially challenging given that the use of ICTs in higher education requires additional budgetary allocations for infrastructure, security, bandwidth and software (Greaves, 2005 as cited in Czerniewicz, Ravjee, Mlitwa, 2006: p51). Nevertheless, in South Africa between 2000 and 2003 there was a 62.9% increase in computer equipment expenditure in public higher education (StatsSA figures for those years).

4.2 Organisational factors

4.2.a Changing institutions

ICTs pervade all aspects of a higher education institution's functions, from admissions and athletics to public relations and plagiarism. The pervasiveness of the technology is bound to change the organization profoundly (Stiles, 2004). At the same time as being changed by technology, higher education institutions are being changed by the nature of the student body. The changing demographics of students are changing the organisational culture. Part-time students, for example, who are working may seek different modes of delivery of education. ICTs can play a role in distance models of education or blended modes of delivery. ICTs can also play a role in addressing educational development challenges.

4.2.b Integration of ICTs in higher education institutions

Organisational culture shapes the implementation of ICTs for teaching and learning and understanding the organisational form of an institution can assist in developing appropriate strategies for the successful integration of ICTs into education (Conole & Oliver, 2007). There are four ideal organisational types classified in terms of control over implementation and control over policy definition (according to McNay, 1995, as cited in Conole & Oliver 2007):

- bureaucratic organisations have tight control over implementation and loose control over policy definition,

- collegial organisations have loose control over implementation and loose control over policy definition,
- enterprise organisations have loose control over implementation and tight control over policy definition and
- corporate organisations have tight control over implementation and tight control over policy definition.

The organisational approaches to the integration of technology vary between the "1000 flowers bloom (or wilt?)" approach and the "targeted project" approach (according to Stiles 2006). Policy distinctions exist between institutions which require a "minimum online presence" and those which encourage the use of ICTs but do not demand it.

However, the integration of ICTs for teaching and learning goes beyond an elearning strategy. It requires effective linkages with institutional structures and strategies for staff development, for teaching and learning, for curriculum development, for academic planning and reviews, and for quality assurance. The growth in online content and electronic databases also brings to the fore the need for critical literacy development strategies and highlights institutional plagiarism strategies.

4.2.c Staff development strategies

The question of how academics can be assisted in realising disciplines- appropriate possibilities of educational technology opens another interesting debate. There is a view that educational technology structures are most effective when they are faculty-based and closely aligned with research, and teaching and learning structures supporting specific disciplines. Discipline specific teams contribute to curriculum development with educational technologists contributing learning, technology expertise and the discipline specific knowledge framing all the work.

Another side of the debate however is that disciplines are often siloed in terms of teaching and research. Staff development initiatives around educational technology can be a bridge between disciplines and assist in the development of communities of practice around shared interests and facilitate collaboration. A larger cross faculty educational technology unit may also achieve considerable synergies concerning technologies, practices and processes including more rapid transfer of good practice across the institution.

4.2.d Intellectual property

Intellectual Property[16] (IP) is becoming increasingly important in the digital age. New areas of concern are arising due to the introduction of Web 2.0 technologies.

Since these technologies enable and facilitate content generation, sharing, repurposing and consumption, questions regarding ownership of content are thrown into sharp relief. Copyright becomes complicated when more than one author is involved particularly if individuals are located in different countries with different copyright laws or when institutional policies for one author and external site policies are applicable to the other author (Franklin & van Harmelen, 2007: p15).

Although works maybe copyrighted, many users are unaware that they may be violating copyright because creating, sharing and adapting material is so easily enabled through web 2.0 technologies.

[16] Intellectual Property (IP) refers to 'the protection of literary, musical and artistic works (copyright), inventions (patents), performances, broadcasts and sound recordings (related rights) and distinctive marks, signs, indications (trademarks and geographical indications) and protection against unfair competition' (Wendland, 2006?: p1)

Web 2.0 technologies raise particular concerns for higher educational institutions in terms of the content produced or repurposed by students in the course of their studies. If institutions claim ownership of this content, is the institution responsible for offensive content or copyright infringements for copied and repurposed material? And what happens to student content after they graduate or leave the institution (Franklin & van Harmelen, 2007: p16)? These issues have to be considered in institutional policies on Intellectual Property.

Institutions therefore need control and monitoring mechanisms of ICT-based services (such as online learning environments, blogs, wikis etc.), legal protection and insurance against issues of copyright violations and ownership in the digital age. However, these control and monitoring mechanisms need to be carefully balanced with concerns over censorship and academic freedom (Franklin & van Harmelen, 2007 p16).

If the institution instituted control and monitoring mechanisms, it will need to establish whether offensive or irrelevant material should be removed and who will be responsible for monitoring and removing content. Would this be the responsibility of the course convenor or a central institutional service provider?

4.3 Pedagogical and epistemological factors

4.3.a Curriculum frameworks

Institutional e-learning policies and e-learning curriculum frameworks enable and support the use of ICTs for teaching and learning. An institutional e-learning policy may enforce the use of ICTs through top-down mechanisms and requirements for minimum presence of ICT use or the policy may be an enabling policy which leaves the use of ICTs up to the individual lecturer.

4.3.b Academic planning and reviews

Institutional e-learning quality assurance mechanisms and frameworks ensure the quality of ICT use for teaching and learning.

4.3.c Research-teaching tensions

In universities which describe themselves as research- driven or research-intensive, research takes precedence over teaching. Thus rewards and incentives for research take precedence over rewards and incentives for teaching and learning. It may therefore be difficult for ICT-mediated innovation in teaching to be recognised.

4.3.d Educational technology curriculum support

Educational technology support for students and staff is required for successful integration of ICTs into higher education curricula. Academics need assistance in understanding and exploring the possible ways that ICTs can help curriculum objectives be achieved. Educators and learning designers need to have a good understanding of the affordances of particular kinds of technology in relation to particular disciplinary-based learning challenges and teaching needs. This knowledge can be developed through staff development interventions such as workshops and seminars which raise awareness about the use of ICTs for teaching and learning and develop knowledge and skills required for integrating ICTs effectively into curricula.

4.4 Technological factors

4.4.a Infrastructure costs

The uptake of ICTs by higher education institutions is correlated with how enabling the institutional environment is, particularly in terms of institutional policies; the general ICT infrastructure available; and ICT support.

Ongoing institutional funding is therefore required for maintenance, upgrades, replacement of ICT hardware, licensing of software, costs of capacity for open source development, and human resource capacity to sustain ICT functionality. In addition, budget is needed in order to be responsive to trends as they emerge, for example new kinds of social software, simulation software, and online games.

4.4.b Flexible learning requirements

Course delivery modes can vary from 'mixed-mode' or blended learning (face-to-face contact sessions with access to online activities) to fully online delivery modes. Flexible delivery modes are not possible without sufficient and appropriate access to technology. Institutional infrastructure influences computer access and use for staff and students. While technology makes extended access possible, lack of technology reduces and restricts possibilities and effectiveness. In addition, the cost of ICT access for individuals in informal learning environments off campus needs to be considered.

Where students are mostly working adults and ICTs are used to mediate the teaching and learning processes, can online or blended courses specify certain technological standards in order for students to be able to register for a course? This raises the issue of the ethical implications of excluding students from specific courses on the grounds of technological access (non- access).

4.5 Interventions and investigations

Having described the issues and debates, this section considers how these concerns and challenges in the institutional domain can be addressed, and how opportunities can be exploited. It provides some suggestions in response to the question, What can be done? This is done in two ways by considering potential interventions, which may be considered development initiatives and potential investigations which suggest possible research questions. Ideally such projects would contain both development and research dimensions.

4.5.a Possible interventions

Numerous projects exist which could address the issues described above. At the most general level, these include

- The development of institutional elearning policies.
- The development of institutional elearning curriculum frameworks.
- The development of institutional quality assurance policies and mechanisms
- The development of institutional structures to support students and staff in the use of ICTs for teaching and learning
- Improvement of ICT support for students and staff
- The development of more flexible technological responses to teaching and learning needs
- Developing institutional Intellectual Property Rights policies
- Developing ways of making institutional repositories more accessible for learning and teaching through the use of Web 2.0 technologies, including tagging, folksonomies and social software (Franklin & van Harmelen, 2007)
- Developing good practice guides to support open creation and re-use of material with particular emphasis on legal aspects of ownership and IPR, including responsibility for infringements in terms of Intellectual Property Rights (Franklin & van Harmelen, 2007).

- Developing practice guides for long term access to student created content once they have left the university (Franklin & van Harmelen, 2007).

4.5.b Possible investigation

Research projects may consider questions such as:

- Are there culturally specific ways of doing university education, in the UK, the USA, Africa and the "rest of the world"? (Ivala and Moll 2005)
- Is there a "dumbing down" of university education in the face of its contemporary commercialization and industrialization which is irresistible, or can universities incorporate ICTs in their delivery strategies and at the same time retain the deep learning that is distinctive of the role they have traditionally played in society? (Ivala and Moll 2005)
- What are the emerging roles and responsibilities associated with e-learning activities (management, technical, research, dissemination, evaluation, training)?
- What are the different views of elearning and its role amongst academics and support staff?
- How are institutions dividing roles and responsibilities for elearning and how much training and support is staff getting?
- What do we understand about how institutions are currently structured in relation to implementation of e-learning?
- How can we build a picture of what changes will be required to make the shift to using online learning systems to support e-learning?
- How can ICTs be used to support institutional multilingualism policies?
- What institutional issues are arising as a result of e-learning activities? What institutional support issues have arisen as a result of the development and what are the strategic implications?
- What institutional issues are arising as a result of e-learning activities?
- What institutional support issues have arisen as a result of the development and what are the strategic implications?
- What quality assurance methods have been developed and used?
- What are the key organisational issues and challenges associated with implementing large-scale e-learning initiatives?
- How can we manage the transition from existing practices and processes to effective use of new systems?
- What are the accessibility issues associated with new technologies and how can these be addressed?
- What are the mechanisms needed to provide remote access to a variety of different users?
- What are the institutional barriers and enablers to these kinds of developments?
- How can e-elearning be harnessed to promote lifelong learning and widening participation?
- When an ICT-based learning environment is set up in a university, are there sufficient mentoring and student support systems in place to ensure that the required depth of learning takes place? (Ivala and Moll 2005)

4.6 In summary

The institutional domain is summarised in the matrix below.

The Institutional Domain	Socio-economic factors	Organisational factors	Pedagogical & epistemological factors	Technological factors
	Issues and debates			
	An enabling environment Economic pressures	Changing institutions Integration of ICT institution-wide IPR frameworks Staff development strategies Intellectual Property	Curriculum frameworks Academic planning and reviews Research teaching tensions Educational technology curriculum support	Appropriate responsive infrastructure Maintenance Flexible learning requirements
	Interventions			
	Enabling cultural shifts IPR policy	Institutional elearning support structures Academic planning Academic reviews Intellectual Property	Curriculum frameworks including elearning & quality assurance frameworks Staff development Teaching rewards & incentives Multilingualism	Infrastructure support Flexible learning initiatives ICT choices Institutional repositories
	Investigations			
	Culturally specific higher education? Interplay between broader trends and institutions Institutional barriers and enablers	Emerging roles & responsibilities with respect to elearning? Organisational structures for elearning implementation? Change management required for elearning?	Effectiveness of interventions? ICT & principles ICTs and multilingualism	Accessibility issues in relation to ICTs Remote access for different users

5 Disciplinary Domain

5.1 Socio-economic factors

5.1.a Policy environment

The national policy environment is likely to influence the growth or diminishment of certain disciplinary areas, given that certain disciplines may be encouraged, enabled or supported at the expense of others. In South Africa for example, Maths, Science and Technology are valued and resourced. Some consider this to be taking place at the expense of the social sciences and the humanities, raising issues about the role of higher education in general. Technology in particular is valued in national policies which support participation in a globalised information society.

The lack of valuing and resourcing of certain disciplines has implications both for higher education and for society generally. This has been seen as prioritisation of 'utilitarian' subjects (Information Systems, Computer Sciences, Commerce, Accounting and so on) over the humanities and natural sciences and the devaluing of humanities and values - such as democracy, fairness and justice in current political climate of South Africa.(Southall and Cobble 2002, pg 11).

5.1.b Differential funding

Differential state funding of disciplinary areas is evident through structures which subsidise both teaching and research.

Teaching-related funding differences can be seen in structures which partly allocate state funding according to subject matter classification. South Africa's Classification of Educational Subject Matter (CESM) taxonomic coding scheme (Education, 2004) for example, organises subject matter into 22 (first order) categories and a wide variety of categories to the fourth order. State funding is partly determined by CESM classification (the Teaching Input Grid being a dimension of the funding formula), with for example the social sciences receiving half of the funding of the physical sciences. Therefore a new Masters in Educational Technology programme located in Computer Science would receive more state funding than the same programme located in Education.

Disciplines also have different levels of funding in terms of research and industry money so there is bound to be financial inequity which impacts on the availability and use of ICTs. A recent South African National Research Foundation annual report demonstrates this differentiation in national expenditure in research and development in major research fields (pg 50 Figure 12) showing how much more the natural sciences and the engineering sciences are allocated per annum compared to the social sciences and humanities amongst others.

Disciplinary funding is also affected by financial relationships with the private sector. A study of academic funding in Nigerian universities shows that industry involvement in Nigerian universities includes the endowment of professional chairs in certain disciplines and not in others (Donwa, 2006).

5.1.c The student body

Disciplines are likely to have different student bodies with different levels of exposure to ICTs - this could impact on Computer Literacy competence. The differences in student groups can result from the different entrance requirements of various courses. Many university web pages provide details of these differentiations.

5.2 Organisational factors

5.2.a Institutional –disciplinary tensions

While the institution provides community and set of structures, disciplines provide different communities and sets of structures. These co-exist but may clash in terms of allegiances and priorities.

At an institutional level disciplines may be enabled or constrained in terms of status, funding and structures. This may be exacerbated by institutional centralisation- decentralisation strategies. For example, decentralised ICT funding across faculties can create inequities - thus "if you registered for Economics in the Humanities faculty you will wait three times longer for a place in the lab than if you registered for Economics in Commerce" (Brown and Czerniewicz, 2006).

A tension may also exist with regards staff development, as described earlier. It may be in the interests of a disciplinary community to grow discipline-specific communities of educators teaching with technology, as there are more likely to be agreements regarding which strategies are more useful, which research and teaching approaches are most appropriate, and how ICTs can best be used to support disciplinary objectives. On the other hand, institutional communities of educators grow a community of practice located in a shared context, transcending disciplinary constraints and offering alternative efficiencies and advantages.

5.2.b The nature of the discipline

Some disciplinary areas by their nature or need or are more likely to be using ICTs e.g. film and media studies, architecture (Computer Assisted Design software), engineering (MATLAB), possibly geography (GIS), some business/ commerce professions (Hicks and Noakes, 1995; Wen and Ling, 2007)

The challenge is using ICTs appropriately to serve the specific needs of the discipline, rather than for the sake of it. Is the use of ICTs always appropriate in specific disciplines? Is it an automatic good?

Fields with tightly controlled research cultures such as the hard pure disciplines of Science and Health Science will develop a coherent field based strategy for the uptake and use of ICTs (Fry 2004). On the other hand, disciplines which are less hierarchical and intellectually pluralistic (i.e. the soft disciplines in the social sciences and commerce), are more likely to continue to rely on face to face communication and will appropriate ICTs in an ad-hoc localised manner (Fry, 2006). How contained or open is it appropriate for disciplinary practices to be? How does disciplinary research culture impact on disciplinary ICT use for teaching and learning?

5.3 Pedagogical factors

5.3.a Disciplinary-related teaching strategies

Disciplinary based understandings inform teaching and learning strategies and approaches, and related theories of learning. A study of teachers' differences in terms of their teaching approach., showed that pure hard disciplines (such as science) had a less student-focused approach compared to pure soft and applied soft groups (such as humanities and business) and were conversely higher on the scale that measured teacher focus than the other two (Lindblom-Ylanne, Trigwell, Nevgi and Ashwin, 2006).

How can disciplinary practices be challenged? How can academics look beyond the models of teaching and learning that they take for granted and examine the value of alternate models (Marincovich and Prostko 2004)?

5.3.b Disciplinary-related teaching ICT-mediated teaching strategies

ICTs provide an opportunity for academics to reconsider the models of teaching and learning that they take for granted and examine the value of alternate models (Marincovich and Prostko, 2004).

Research has also demonstrated that teachers' attitudes towards using ICTs are inextricably linked with their perceptions of the nature and content of their subject areas (Selwyn, 1999). Particular ICT affordances are exploited to support particular strategies in particular disciplines, these generally supporting traditional strategies (Czerniewicz and Brown, 2007).

These claims that have been made about disciplinary differences by research in teaching and learning need to be explored in the light of ICT mediation because different disciplines do integrate digital resources into the curriculum in different ways (Jones, Zenios and Griffiths, 2004). It is important to understand why in order to make sure that interventions are effective and take cognisance of the uniqueness of the discipline.

5.3.c ICT-mediated teaching support

There is an argument that ICT interventions can only be effective if they are closely aligned to the practices of discipline-based academics using ICTs for education. On this basis educational technologists, providing support to academics, should become part of discipline specific communities of practice and should ideally be originally trained in those disciplines (rather than in educational technology per se). The alternative view is that communities of reflective practitioners can be supported who reflect on teaching practices across disciplinary terrains.

5.4 Technological factors

5.4.a Access to ICTs

Access to ICTs differs across disciplines. A recent regional study in South Africa showed that there were definite differences in access to ICTs in the broad sense of the word i.e. (including technological resources, personal agency, contextual resources and digital content) across disciplines with Engineering and Health Science students having much better access than Science and Business students (Brown and Czerniewicz, 2007).

Non-use in conditions of access needs to be investigated, as it may be an appropriate and reasonable response to disciplinary demands and cultures

5.4.b Computer literacy

Computer literacy differs between disciplines. An online skills assessment conducted of students across all faculties in a South African higher education institution showed that Science students' computer literacy was about 10% lower than students from other faculties (Oberprieler 2006).

At the same time, given that the relationship between computers and subject cultures are diverse and complex (Selwyn, 1999), it is important for those not using computers not to be considered deficient in some way.

5.4.c Specialist needs

Different software is used across different disciplines. Students in mathematically based disciplines such as science, engineering and commerce use software oriented to computer modelling whilst those in discursive disciplines such as humanities tend to use more text based software. Online learning software to date has favoured the text based disciplines in

that they have not adequately integrated tools such as mathematical equations or modelling as well as specialised software.

Practical technological consideration such as ease, adequacy, safety etc must be taken into account. This may be more of an issue in disciplines that require use of expensive specialised software e.g. Engineering (CAD in Architecture) and Science (GIS in Geography for example) where students need to be on campus (often after hours) in order access required software.

5.4.d Graduate competencies

Technological competences are necessary as a graduate outcome in most disciplines. For example data from the US indicated that only 8 out of 54 new jobs in the US do not require technological literacy. However not all disciplines have compulsory nor expansive computer literacy training (Oberprieler 2006).

5.5 Interventions and investigations

Having described the issues and debates, this section considers how these concerns and challenges in the disciplinary domain can be addressed. It provides suggestions in answer to the question, What can be done? This is done in two ways by considering potential interventions, which may be considered development initiatives and potential investigations which suggest possible research questions. Ideally such projects would contain both development and research dimensions.

5.5.a Possible interventions

Numerous projects exist which could address the issues described above. At the most general level, these include:

- Staff development initiatives focusing on disciplinary ICT-mediated teaching.
- At the discipline level opportunities exist to use educational technology to change or enhance teaching practices within disciplines.
- The development of more equitable funding across higher education institutions for disciplinary uses of ICTs.
- The development of discipline specific software tools e.g. software for the development of argumentation skills (as used for example in Philosophy)
- The development of the interactive tutorials used to support generic skills across disciplines e.g. interactive spreadsheet tutorials used to support quantitative literacy skills

5.5.b Possible investigation

Research projects may consider questions such as:

- How do ICTs mediate existing disciplinary-based pedagogical practices?
- Does the use of ICTs challenge, transform or disrupt teaching and learning strategies traditionally associated with particular disciplines?
- Is it possible that ICTs mediating knowledge construction may change the knowledge construction process itself?
- How are ICTs changing knowledge dissemination strategies in different disciplines differently?
- How do new forms of knowledge production and dissemination (through Web 2.0 for example) play out in different disciplinary domains?
- Can ICTs deliver more than just “the information” associated with any area of knowledge? Can knowledge in its deepest sense “be delivered over the web”? (Ivala and Moll 2005)
- How closely aligned are the possibilities of ICTs to existing pedagogical practices? Should ICTs support such practices or overturn them?
- Does the use of ICTs alter the nature of pedagogy in certain disciplinary conditions?

- To what extent is educational technology a multi-disciplinary undertaking (Kozma 2000)?

5.6 In summary

The disciplinary domain is summarised below.

	Socio-economic factors	Organisational factors	Pedagogical & epistemological factors	Technological factors
	Issues and debates			
The Disciplinary Domain	Policy environment National enabling and constraining factors Differential funding The student body	Institutional enabling and constraining factors The nature of the discipline ICT-mediated teaching support	Discipline specific teaching & learning ICT mediated strategies	Faculty access to ICTs Discipline specific computer literacy Specialist needs Graduate technological competencies
	Interventions			
	Funding incentives across HE institution for specific disciplines	Staff development to support discipline specific ICT-mediated teaching strategies	Specific ICT mediated disciplinary strategies	Discipline specific software development
	Investigations			
		Staff development as a disciplinary or generic activity?	ICT mediation of disciplinary practices? Knowledge dissemination	Effectiveness of ICT disciplinary specific interventions

6 Teaching and Learning Domain

6.1 Socio- economic factors

6.1.a Student diversity

Higher education globally is under pressure to increase participation from diverse groups of students and to produce the skills required for a rapidly changing society. This has implications for the teaching strategies used, as diversity in students' academic preparedness, language and schooling background poses major teaching and learning challenges for higher education (Jaffer, Ng'ambi & Czerniewicz, 2007). In addition, working adult students and non-traditional students experience and approach learning differently from students who enter higher education directly from the school system.

While educational technology offers some opportunities and additional strategies to deal with these challenges and student diversity (see Jaffer, Ng'ambi & Czerniewicz, 2007) and offers new ways of extending access to higher education by supporting lifelong learning to non traditional students, claims that educational technology will increase access to higher education or automatically enhance the quality of teaching and learning should be treated with caution (Ravjee, 2007).

Social and economic class background not only affects students in terms of academic preparedness for higher education but also enables or constrains the learning domain by creating unequal off-campus access to computers while on-campus access may be equal (Czerniewicz & Brown, 2006).

6.2 Organisational

6.2.a Resources

Institutional budgets and resourcing strategies (centralized or decentralized to faculty level) impact on the available infrastructure and resources (e.g. computers, data projectors, network connections, bandwidth) and therefore on the potential range of ICT-mediated teaching strategies. In residential contexts, there are resourcing, infrastructural and security implications for the conversion of existing teaching spaces in order to enable ICT use (in lecture theatres for example, functional data projectors may need to become standard, seminar rooms may need panaboards and smart boards).

Resourcing challenges may be addressed by specific professions with which disciplines have relationships (e.g. commerce and engineering have strong higher education- private sector alliances). Such disciplines may therefore be advantaged by their relationships with the private sector. State policies which value or reward specific disciplines, such as mathematics or science, may also advantage certain disciplines in terms of resources (computers or qualified, sufficient educators), thus improving the quality of the classroom experience.

In addition to the costs of expanding and extending facilities there are organizational issues with respect to centralization or decentralisation and after hours access as learning spaces expand from on campus 9 to 5 use to 24-hour use both on and off campus.

6.3 Pedagogical and epistemological

6.3.a ICT-based pedagogic practices

The uses of ICTs for teaching and learning are dependent on the purpose of the learning activity, the nature of the content or discipline, the preferred teaching approach or underlying

philosophy of the teacher, what technology can or cannot do and the available resources (Czerniewicz, 2002).

Writing about ICTs in Higher Education in Africa, Mhlanga & Moll (2007) note that the key theories informing practice are 'mostly drawn from what knowledge is believed to be and how the human mind is best capable of acquiring it'. ICT-based teaching and learning is structured on the principles of interactivity advocated by behaviourist theories of learning, reflectivity, mental dialoguing, and memory underlying cognitive theories of learning and learner-centredness and learning by doing propounded by constructivism.

Many of the claims in the literature take the form of hype which portrays ICTs in education as unproblematic and able to resolve the challenges experienced in education. Even respected academics fall prey to this as in, 'The web offers a host of very powerful affordances to educators. Existing and older education provisions have been defined by the techniques and tools designed to overcome the limitations and exploit the capacities of earlier media. […] The Web provides nearly ubiquitous access to quantities of content that are many orders larger than those provided by any other medium' (Anderson, 2004: 52).

Skeptics on the other hand downplay the role that ICTs could play in transforming education. This view highlights the false promises of technology to bring about improvements in education (Noble, 1998; Dreyfus, 2001). Other skeptic views warn about the potential dangers of focusing on ICTs rather than learning e.g. '[T]echnology may be a good solution for some instructional problems, and in some cases it may be a partial solution. But in other instances technology does little to address the fundamental teaching and learning issue or –even worse – provides a glitzy but inappropriate solution to a problem that has simply been misconstrued. (Knapper, 2001: p94).

Techno-deterministic claims that ICTs and flexible delivery possibilities somehow cause changes to teaching approaches and methods need to be treated with caution. More useful are approaches and studies which show that that the use of educational technology may be the catalyst for educators to reflect on teaching philosophies and practices.

There is a powerful perspective which exists to counter many of the technologically deterministic positions taken both by the techno-evangelists and the techno sceptics. This view argues that pedagogy should be driven by the contextualised teaching and learning needs rather than the technology (Kirkup & Kirkwood, 2005; Wagner, 2001). Similarly, educational technology should not be seen as the solution to all educational challenges but rather offering opportunities to extend the range of teaching and learning activities (Jaffer, N'gambi & Czerniewicz, 2006).

6.3.b Emerging views about learning and ICTs

New views, which have not been fully researched yet, are emerging in relation to ICTs and learning. ICTs enable alternative modes of representing knowledge which were not possible before the digital age. As such digital modes of representing knowledge may offer new dimensions to academic learning (Ivala & Moll, 2005: p43).

Hypertext offers 'enormous complexity of networks of knowledge and the paradigmatic nature of the practices through which researchers, teachers and learners navigate through these networks' and enables the student to be both reader and producer of texts (Ivala & Moll, 2005 p50). As such, Ivala and Moll encourage investigation of the relationship between learning and hypertext.

It is assumed that ICTs not only 'deepen the quality of teaching and learning of higher order cognitive skills, but also cover other desirable skills such as critical thinking, problem

solving, ability to learn independently, knowledge navigation, and working as teams in constructing personalised knowledge' (Mhlanga and Moll 2007).

6.3.c ICT-based assessment

Assessment is key to learning. ICTs are particularly useful as formative assessment tools since ICTs can be used to provide learners with immediate automated feedback which confirms learners' understanding of concepts or highlights gaps in their knowledge.

ICTs can also be used for summative assessment e.g. multiple choice quizzes. Automated tests give immediate feedback, reduce cheating by randomizing questions and can reduces the amount of time the teacher spends on summative assessment therefore freeing time for conceptual development or for additional support for student learning. Such forms of assessment are often product-focused rather than process- focused or assess procedural knowledge rather than conceptual knowledge.

At the same time there is a disjuncture between innovative ICT- mediated teaching strategies and traditional forms of assessment. This may prove a stumbling block to effective use of ICTS in the classroom.

6.3.d Pedagogic relationships

ICTs are said to challenge traditional teacher-student relationships since technology opens up avenues to knowledge experts. Students can therefore be less reliant on the expert knowledge of the teacher. The notion of the teacher as facilitator or 'guide on the side' as opposed to the 'sage on the stage' has become fashionable with the rise of constructivist modes of pedagogy and particularly so in ICT-enabled environments. However, the prevalence of the teacher as facilitator in higher education institutions requires further research.

ICTs enable and facilitate peer to peer relationships, a practice which is on the increase and becoming the object of study. At a South African university, for example, the independent use of ICTs by students to facilitate group tasks was noted (Marquard, S. forthcoming). An Irish study noted that online peer-assisted learning develops greater self-regulation amongst students (McLuckie and Topping, 2004).

New technologies enable greater powers of surveillance (The Internet of things p95, ITU site). Care should be taken not to undermine teacher-student relationships or peer-peer relationships through surveillance in ICT-based learning environments.

6.3.e ICT literacy

ICT literacy for students and teachers remains a concern. Both students and staff need sufficient computer and information literacy to exploit the possibilities of ICTs for teaching and learning. This is true not only for students from disadvantaged backgrounds but also because it cannot be assumed that the "Net Generation" are computer and information literate as required by higher education (New Horizon Report, 2006; Walton & Archer, 2004)

ICT-mediated learning and teaching practices do not alleviate the need for the development of academic literacies, and generally make these more complex. Easy access to online content makes the need for critical and information literacies more pressing and crucial, not less so. The International ICT Literacy Panel in their framework for ICT literacy emphasise that the definition of the digital divide needs to be expanded to include the impact of limited reading, numeracy and problem-solving skills because these are essential to 'access, manage, integrate, evaluate and create information in order to function in a knowledge society' (ETS, 2002: p2).

6.3.f IPR and plagiarism

Student plagiarism is facilitated and exacerbated in ICT-based environments. While punitive measures for plagiarism are necessary, plagiarism is often linked to academic and information literacy. Some students may be genuinely unaware that they are plagiarising. Others may be aware that they are plagiarising but lack the skill of citation and referencing practices required for academic writing. The development of academic and information literacy is therefore key in preparing students to successfully negotiate their way through university studies. Equally important is raising educators' awareness of the differences between deliberate plagiarism and the need for developing and supporting students' academic literacy.

6.4 Technological factors

6.4.a Perspectives on technology

There is a debate raging as to whether technology is neutral or value laden, as described earlier. The neutral view suggests that technology is a tool which can be used to support any teaching approach or learning style as the theory lies in the people or the educational concept not in the technological tool (i.e. people kill, not guns). The value laden approach argues that technological tools have historical designs and decisions built into them which enable and constrain pedagogical possibilities[17].

6.4.b Open source and learning

There is an argument that open-source learning environment are more likely to support a range of teaching and learning approaches and theories as they are flexible and customizable while proprietary software is likely to be a "one size fits all" solution. Some open sources learning environments, such as *Moodle*, claim that they are specially designed to support constructivist learning (*Moodle* website).

6.5 Interventions and Investigations

Having described the issues, debates, this section considers how these concerns and challenges in the teaching and learning domain can be addressed. It provides possible answers to the question, What can be done? This is done in two ways by considering potential interventions, which may be considered development initiatives and potential investigations which suggest possible research questions. Ideally such projects would contain both development and research dimensions.

6.5.a Possible interventions

Numerous projects exist which could address the issues described above. At the most general level, these include:

- Interventions focusing on improving student computer literacy
- Capacity development for academic staff to raise awareness about the potential uses of ICTS for teaching and learning and to develop their skills to enable effective use of ICTs for teaching and learning.
- Curriculum development projects using ICTs for particular teaching and learning outcomes and to address particular challenges
- Learning design for both opportunities and constraints in specific disciplinary contexts

[17] Tools usually reflect the experiences of other people who have tried to solve similar problems at an earlier time and invented/ modified the tool to make it more efficient. This experience is accumulated in the structural properties of tools (shape, material, etc.) as well as in the knowledge of how the tool should be used. Tools are created and transformed during the development of the activity itself and carry with them a particular culture - the historical remnants from that development. So, the use of tools is a means for the accumulation and transmission of social knowledge (Bannon, 1991).

6.5.b Possible investigations

- What is the distinctive "way of thinking" that constitutes academic learning, as opposed to learning in other kinds of educational institutions and in everyday life contexts, and how is this affected by technology?[18] (Ivala and Moll 2005)
- What is effective pedagogy in terms of using learning technologies? (Connole & Oliver, 2007)
- Will the use of ICT result in new forms of pedagogy? (Connole & Oliver, 2007)
- What are students' experiences of using technologies and which do they use and for what purpose? (Connole & Oliver, 2007)
- What are the inherent affordances of different technologies? (Connole & Oliver, 2007)
- What forms of collaborative activities were occurring and how can these be supported? (Connole & Oliver, 2007)
- Are current teaching and assessment activities appropriate in an elearning context? (Connole & Oliver, 2007)
- How do current assessment practices enable students to demonstrate what they have learned and what is the role of e-assessment? (Connole & Oliver, 2007)
- What are the design and development issues associated with the production of ICT-based materials?
- What pedagogical models are course developers using, how explicit are they and how effectively do they translate into practice?
- What are the best methods of integrating ICT within the broader learning and teaching context?
- Are there pedagogical models underpinning Online Learning Environments and how do these influence the way these systems are used?
- How are different tools available within Online Learning Environments used to support learning?
- What are students' experiences of online courses?
- Which aspects of Online Learning Environments are educators using and for what purposes?
- Which aspects of Online Learning Environments are students using and for what purposes?
- What new forms of literacy are emerging for students and teachers?
- What mechanism can be used to provide support to ensure that teachers make effective use of technologies for teaching and learning?

6.6 In summary

The teaching and learning domain is summarised below

[18] This should not be taken to imply that the learning that is characteristic of "other kinds of educational institutions" and of "everyday life contexts" are necessarily of the same order.

The Teaching and Learning Domain	Socio-economic factors	Organisational factors	Pedagogical & epistemological factors	Technological factors
	Issues and debates			
	Student diversity HE problems	Resourcing	ICT-mediated pedagogic practices Emergent theories of learning Assessment Pedagogic relationships ICT literacy IPR & plagiarism	Technology perspectives Open source
	Interventions			
	Increasing access	Equal resources	Targeted use of ICTs for teaching and learning Curriculum projects New forms of ICT mediated interventions	Developing pedagogic tools ICT literacy interventions
	Investigations			
	The relationship between social and pedagogic?	Enabling transformation?	New forms of cognition? Effective ICT-mediated pedagogy Pedagogic models	Investigating affordances

7 Mapping issues, investigations or interventions

This narrative account has foregrounded the different domains as the entry point to a describing issues and identifying interventions or investigations. It is also possible to map each of these elements separately should that be the required focus.

7.7 Matrix of Issues

	Social –economic factors	Organisational factors	Pedagogical & epistemological factors	Technological factors
The Global Domain	Information society discourses and higher education	Growth in student enrolment in higher education	New social and learning practices	Trends reported from developed countries
	The opening up of higher education	New kinds of higher education institutions	The rise of the NetGeneration	The rise of mobile platforms
	ICTs and development	The rise of new organisations relevant to higher education	The relationship between web 2.0 and higher education	The digital divide
The National Domain	National elearning policy frameworks	On-off campus access	National curriculum frameworks	An enabling national infrastructure
	ICTs in / across national policies	ICTs in / across national structures	National Quality Assurance frameworks	Uneven infrastructure-quantity & quality
	Social divides		Elearning quality assurance	Bandwidth
	Intellectual Property			
The Institutional Domain	An enabling environment	Changing institutions	Curriculum frameworks	Appropriate responsive infrastructure
	Economic pressures	Integration of ICT institution-wide	Academic planning and reviews	Maintenance
		IPR frameworks	Research teaching tensions	
Disciplinary domain	Policy environment	Institutional enabling and constraining factors	Discipline specific teaching & learning	Faculty access to ICTs
	National enabling and constraining factors	The nature of the discipline	ICT mediated strategies	Discipline specific computer literacy
	Differential funding	ICT-mediated teaching support		Specialist needs
	The student body			Graduate technological competencies
Teaching and learning domain	Student diversity	Resourcing	ICT-mediated pedagogic practices	Technology perspectives
	HE problems		Emergent theories of learning	Access
			ICT- mediated assessment	Open source
			Pedagogic relationships	Educational Technology support
			ICT literacy	
			IPR & plagiarism	

7.8 Matrix of Investigations

	Social – economic factors	Organisational factors	Pedagogical & epistemological factors	Technological factors
The Global Domain	NetGen in different contexts?	The role of HE in the information society?	Are there new ICT mediated practices and what do they look like?	Comparative trends and patterns of ICT access and use?
National Domain	Role of state policy to enable & constrain?	Effectiveness of enabling structures?	National patterns of access & use	
	Role of ICTs in providing access to HE			
Institutional domain	Culturally specific higher education?	Emerging roles & responsibilities with respect to elearning?	Effectiveness of interventions?	Accessibility issues in relation to ICTs
	Interplay between broader trends and institutions	Organisational structures for elearning implementation?	ICT & principles	Remote access for different users
	Institutional barriers and enablers	Change management required for elearning?	ICTs and multilingualism	
Disciplinary domain	Staff development as a disciplinary or generic activity?	ICT mediation of disciplinary practices?	Effectiveness of ICT disciplinary specific interventions	
			Knowledge dissemination	
Teaching and learning domain		Enabling transformation?	The relationship between social and pedagogic?	Investigating affordances
			New forms of cognition?	

7.9 Matrix of Interventions

	Social – economic factors	Organisational factors	Pedagogical & epistemological factors	Technological factors
The Global Domain	Support for initiatives designed to overcome the digital divide	ICT-mediated interventions which address the needs of particular groups of student	Teaching and learning tasks based on social software	Uses of current software for educational purposes
	Enabling private-public partnerships to the advantage of public education imperatives	Support for initiatives which improve access	ICT-mediated interventions which address specific HE problems	Learning activities and resources using mobile technology
	Initiatives for borderless HE	Creation of an enabling environment for elearning		
National Domain	Policy development & integration	Interventions in specific ICT mediated areas e.g. disability, support	QA development & integration	ICT infrastructure development
	Addressing policy issues & disjunctures	Addressing off / on campus divides	Curriculum development and review	Equalising infrastructure
	National IPR initiatives			Bandwidth initiatives
Institutional domain	Enabling cultural shifts	Institutional elearning support structures	Curriculum frameworks including elearning & quality assurance frameworks	Infrastructure support
	IPR policy	Academic planning	Staff development	ICT choices
		Academic reviews	Teaching rewards & incentives	Institutional repositories
			Multilingualism	
Disciplinary domain	Funding incentives across HE for specific disciplines	Staff development initiatives	Specific ICT mediated disciplinary strategies	Discipline specific software
Teaching and learning domain	Increasing access	Equal resources	Targeted use of ICTs for teaching and learning	Developing pedagogic tools
			Curriculum projects	ICT literacy interventions
			New forms of ICT mediated interventions	

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