WAYS TO REALISE THE CONCEPT
OF DIGITAL INTEGRATION IN EDUCATION:
DESIGN AND TEACHING-LEARNING

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Future generations will need more than just mastery of subject matter; they will need mastery of learning. The presented study outlines some major changes we expect to make over the next decade, including shifts from teacher-centeredness to student-centeredness and the increasing use of technology-enhanced learning. The outcomes of learning must be reviewed, reformulated and approaches to higher education design and delivery revised to match. The research paper states that the training process should be the whole spectrum of competencies, as well as the research activity. The research study advocates the re-examination of the many pressing and critical issues facing our universities. The research aspects are intended to assist academics, educators and policy-makers in a process of critical reflection of the outcomes and effectiveness of our practices in providing higher education to the present generation in relation to the demand of an industrialised Russia 2020. Research aspects were selected from a variety of areas important for this critical reflection. In the presented research issue we tried to pull together case observations, analysis of local scenarios and new imperatives of university so as to attain viability and comprehensiveness these include their research and development (R&D), human resource development and foresight on the use of electronic technology and innovative "products" packaging as an alternative instructional mode to enhance the teaching-learning process. Universities 3:0 must be prepared and able to deal effectively with the three basic perspectives confronting them. The resulting scenario, the Cybernetic Campus, is the reform of the Knowledge-Research-Business that is integrated with, and accountable to, the public that hosts it.

Purpose. The main purpose of this research paper is the attempt to apply situational analysis, built on formally different grounds, however trying to take into account the subject requirements. Since it is clear from the stated aim, it is triune that includes both professional and language education, which implies the whole spectrum of communicative competences, as well as the research activity.

Methodology. The purpose and problems of the research have defined the choice of methods. The methods used in the presented research paper include analysis of literature, the study of monographic publications, scientific articles and papers on the research problem. Material was identified mainly by reference searching and electronic literature searching using as search terms higher education, rationales for higher education integration, etc.

We can highlight the following group of methods: the general scientific methods are represented by the following kinds: systematic approach (to analyse and synthesize theoretical and empirical materials); the dialectical approach allows addressing the causes of contradictions; the generalization approach is required throughout the study for the formulation of conclusions and allows us to generalize and systematize the study of theoretical and empirical material; the induction method is used to study the induction of theoretical and empirical information at all stages of the research; the deduction method enables the transition from general to specific provisions of the findings and phenomena.

Results: Based on the dramatic changes in higher education, many approaches to improving curricula are mandatory and experimental in nature; control forms in the learning process are analyzed freely and are not always taken into account. Ideally, the curriculum should be supported by the scientific research of a specialist in professional language at a certain stage in a particular country. Then the final control will combine objective and subjective forms of evaluation. In this respect, the requirements of a modern postgraduate education system, as well as the wishes of graduate students and employers, must be taken into account when developing future training materials and training programs. As the main result of the study, we are considering the possibility of creating a

"cybernetic campus" as a transformation in the commercialization of research and the competitive knowledge development that are integrated and accountable.

Practical implications. *The results are important in the preparation of master's educational programs in the variable part, and also used in the preparation and development of teaching aids and courses in foreign languages for magistracy.*

Keywords: *learning society; dependent capability; knowledge business; knowledge building; negotiate learning; facilitate learning; independently capable individual; educational resources; the objective/subjective assessment forms; innovative teaching-learning models; course requirements; technology-enhanced learning; a communication problem.*

СПОСОБЫ РЕАЛИЗАЦИИ КОНЦЕПЦИИ ЦИФРОВОЙ ИНТЕГРАЦИИ В ОБРАЗОВАНИИ: ПРОЕКТИРОВАНИЕ И ОБУЧЕНИЕ

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Будущим поколениям потребуется не только овладение предметами; им нужно овладеть обучением. В представленном исследовании излагаются некоторые важные изменения, которые ожидаются в течение следующего десятилетия, в том числе изменения от ориентированности учителей до уровня студентства и все более широкое использование обучения с использованием технологий. Результаты обучения должны быть пересмотрены, переформулированы и подходы к разработке и представлению высшего образования пересмотрены в соответствии с требованиями современности. В научной статье говорится, что учебный процесс должен охватывать весь спектр компетенций, а также исследовательскую деятельность. Исследование отстаивает пересмотр многих актуальных и критических вопросов, стоящих перед нашими университетами. Исследовательские аспекты призваны помочь академикам, преподавателям и лицам, определяю-

щим политику образования, в процессе критического отражения результатов и эффективности нашей практики в предоставлении высшего образования современному поколению в связи со спросом на промышленно развитую Россию 2020. Исследовательские аспекты были выбранных из множества областей, важных для этого критического отражения образовательной политики. В представленном нами исследовании мы попытались объединить наблюдения за ситуациями, анализ образовательных сценариев, чтобы достичь жизнеспособности и полноты, включая их исследования и разработки (НИОКР), развитие человеческих ресурсов и прогнозирование использования электронных технологий и инновационную упаковку «продуктов» в качестве альтернативного учебного режима для повышения учебного процесса. Университеты 3:0 должны быть подготовлены и способны эффективно решать три основные перспективы, стоящие перед ними.

Цель. Основная цель научного исследования - попытка применить ситуационный анализ, построенный на формально разных основаниях, с принимая во внимание субъективные требования современности. Такое триединство включает в себя как профессиональное, так и языковое образование, что подразумевает весь спектр коммуникативных компетенций во взаимосвязи с исследовательской деятельностью.

Метод или методология проведения работы: Цель исследования определила выбор методов. Методы, используемые в представленной исследовательской работе, включают анализ литературы, изучение монографических публикаций, научных статей и статей по проблеме исследований. Материал был идентифицирован главным образом путем поиска справочной информации и электронной литературы с использованием в качестве условий поиска высшего образования, обоснований интеграции высшего образования и т. д. Мы можем выделить следующую группу методов: общие научные методы представлены следующими видами: систематический подход (анализ и синтез теоретических и эмпирических материалов); диалектический подход (позволяет устранить причины противоре-

чий); на протяжении всего исследования требуется обобщающий подход для формулирования выводов и обобщению и систематизации изученного теоретического и эмпирического материала; метод индукции для изучения теоретической и эмпирической информации на всех этапах исследования; метод дедукции позволяет перейти от общего к конкретным положениям результатов.

Результаты: Исходя из резких изменений в высшем образовании многие подходы к совершенствованию учебных программ являются обязательными и экспериментальными по своей природе, а формы контроля в процессе обучения анализируются свободно и не всегда учитываются. В идеале учебная программа должна подтверждаться научными исследованиями специалиста по профессиональному языку на определенном этапе в конкретной стране. Тогда окончательный контроль будет сочетать объективные и субъективные формы оценки. В этом отношении при разработке предстоящих учебных материалов и программ подготовки необходимо учитывать требования современной системы последипломного образования, а также пожелания аспирантов и работодателей. В качестве основного результата исследования мы рассматриваем возможность создание «Кибернетического университетского городка» как преобразование в коммерциализации исследований и становлении конкурентоспособных знаний, которые интегрированы и подотчетны.

Область применения результатов: Результаты исследования важны при составления магистерских образовательных программ по вариативной части, а также использовать в процессе подготовки и разработки учебных пособий и курсов на иностранных языках для магистров.

Ключевые слова: научное общество; зависимые возможности; коммерциализация знаний; построение знаний; согласованное обучении; содействие обучению; индивидуальные способности; индивидуальные образовательные ресурсы; объективные/субъективные формы оценки; инновационные модели обучения и обучения; требования к курсам; усовершенствованное обучение; проблема общения.

Introduction

The definite form universities all over Russia ought to take in dealing with the realities of the 21st century is a subject of immense interest. This new form must be moulded by the desire to be contemporary, forward-thinking and societally relevant. To meet new needs and situations amidst our complex and dynamic mature of higher education today, the emergence of the innovative tendency University 3:0 is simply inevitable. Many academicians respond to change with anxiety because it involves redefining value and transforming the "academic culture" [1] of the university; the universities are confronting daunting new challenges, therefore, are forced to deal with these pervasive changes in order to meet the demands of the times: the relevance of their study programmes to social and economic needs, their role in social, economic and political activities, etc.

The real challenge for the University 3:0 is to remain contemporary; it must preserve what is most valuable in its traditions, while at the same time introducing the changes required by a dynamic society. Universities 3:0 must ask which changes they must take, rather than whether or not change will be required [7]. Meaningful and significant change must involve innovation, that is the purposeful action taken to accomplish something new; to achieve this, universities must create environments that encourage innovative thinking and risk taking. Changes involves careful planning and should not be left to chance. The successful change can only last to benefit the university and the academia of it is supported by proven strategies for implementing and sustaining change. Therefore, in any attempt to transform the work philosophy of academia, universities 3:0 must have a well-defined mission with a diversity of goals and objectives. Each academic unit then will have a responsibility of developing its own quality assurance mechanism to fulfil the necessities of the university 3:0 quality standards [9].

The critical importance of higher education to the economic development of the nation is now widely recognised. High-quality basic research at university and high-quality industrial development work are prerequisites for one another. To meet the needs of the people in the

contemporary world, a prime goal for a university 3:0 is the development of competence: competence to develop the innovative capacity of industry, competence to stimulate the vitality of university's own R&D, and competence to participate and contribute to national economic development.

Universities offering postgraduate education must now deal with increasing student costs, rising universities expenses, demand for capable, flexible and adaptable postgraduates, and the power of new electronic technologies. The universities can no longer cite traditional academic imperatives (i.e. the search for truth and knowledge) as reason for ignoring the economic realities of their host communities. Doing more, in a bid to boost the productivity and reduce cost, is not sufficient. Society and professional demands have resulted in a need to re-examine and re-oriented commitment and practices in Universities of higher and postgraduate learning. Employers are concerned about the ability of graduates and postgraduates to cope with the pressure and complexities of working in a rapidly changing, competitive environment. They demand *proficient* and *efficient* graduates and postgraduates that are critical thinkers, innovative, flexible, well-rounded, self-reliant, ethical, entrepreneurial, etc. This challenge and its associated issues were explicitly addressed and taken to task when establishing University of Management "TISBI": *we must not simply expand education but actually, change it. Not only the curricular but the delivery systems and instructional structures must be redesigned if our education system is to be adequate to its social responsibilities. Education now must be socially relevant. It will have to be practically oriented and sensitive to social needs; not just the demands of today and tomorrow, but those of an unfolding future whose details cannot be anticipated* [14].

In a similar vein, the University must be asserting, amongst others, the following aspiration: … *the University is presented with the opportunity, through the devising of innovative curricula and academic programmes and structures, to define the profile of a new breed of postgraduates: professionals who are technically competent in new and rapidly changing fields of knowledge, who have a keen and contem-*

porary understanding of the interdisciplinary convergence of different technical areas and their implications, and who at the same time understand in a truly modern way the broader human, social and cultural context within which their professional knowledge and activities are grounded… it follows that a desired postgraduate profile is one that is based on the development of the individual as an autonomous but cooperative member of society [14].

Further to meet the challenges of capable, flexible and adaptable postgraduates, a university must also extend its education services to greater numbers in order to address manpower needs. This includes continuing education to retrain and /or upgrade the skills of the present workforce. In doing so, must also deal with rising institutional and student costs. Developments in electronic technologies, with the power and potential to enhance learning, education and reduce costs, and more variable to the equation. The core business must, therefore, be re-examined and its processes re-engineered to "optimise the equation".

The core business of the University 3:0 is knowledge: its creation, stewardship, packaging, dissemination and application. Furthermore, this business is an *integral* part of society, i.e. it is an economic endeavour in so far that societies are complex economic systems – and its therefore subject to the same economic realities as other businesses in the community. In as much as it is a human endeavour, it is also subject to the common values and aspirations of its host community. Its products must therefore be of high quality, affordable, accessible and socially relevant. This is quite in contrast to the view of the University 3:0 as one that subordinates everything else to the academic freedom of impartial search for truth and knowledge (the traditional academic imperatives), economic realities notwithstanding. In fact, in this view, such as university must be insulated from pressures that can threaten its undertakings, e.g. the objectivity of its members should never be compromised by as paltry a concern as money.

There is something uncomfortably incongruent, however, in requiring insulation and detachment from a community in order to be of value to it! To be sure, the insulation and detachment are not total; after all,

members of the university live alongside other members of the community. Their efforts will, therefore, not be as impartial and objective as one might believe – the values and aspirations they share with their neighbours will influence their academic judgments. But despite this, their allegiance and accountability are only to the academic imperative! The university as an integral part of society, on the other hand, must clearly be accountable to its host community.

The Knowledge Business viewpoint also changes how we look at postgraduates. They are no longer viewed as "raw material" that the university turns into products (graduates and postgraduates), but constitute its clientele. The University's products are knowledge products: courses, expert consultation/facilitation/supervision, accreditation, indeed the entire learning programme and environment. The higher education imperative now is the creation of a range of such products that offers something for everyone – the support for a *learning society* [2].

The Knowledge Business represents the *processes* that turn inputs (knowledge, expertise, etc.) into consumer outputs. These are under considerable pressure to change as they try to deal with unacceptable levels of postgraduates' costs and universities expenses, emphases on research and postgraduates learning outcomes (social relevancy), and the power of new electronic technologies [4]. Change will be necessary, not only to remain competitive, but to survive. However, increasing productivity and reducing costs is associated administrative process alone will not be enough [7], major cost savings also come from productivity and value-added innovations in the academic area. Where necessary, the scholarships of higher education (Knowledge-Curriculum), research (Researchers–Knowledge) and application (Knowledge-Application/Clients) must be redefined and their associated processes reengineered. The focus will be on higher education aspects of the business: the changes in education philosophy and approaches, and the use of technology-enhanced learning.

The identical format of final control for higher education has not been established yet, and hardly ever possible due to the variety of the preparation programs and specializations [2]. Postgraduates are offered

their own final examination, which assesses the knowledge, abilities, skills and competencies stated in the foreign language program for each University. Nevertheless, the educational process control includes the continuous monitoring not only the students' knowledge, but also the analysis, evaluation and training materials and, if necessary, their possible adjustment [9].

Results

Computer-based information handling is now rich and diverse. We are no longer restricted to text and graphics, just as easily, we can capture, create, change, store, communicate and present high-quality images, audio and full-motion video. Digital audio and video have developed to a stage affordable on microcomputer platforms. Digital integration of these different media allows human-computer interfacing characterised by rich and natural presentation, and high interactivity.

Systems that organise large volumes of multimedia resources, provide for their efficient and flexible search and retrieval, facilitate the interpretation of data (e.g. visualisation), and allow for their arbitrary composition (authoring) for structured or free-form interaction, have also grown in sophistication.

Digital media integration, computers and communication systems define a new media to store and organize information for instant access, correlation, and assembly. The development of ECs using the new media is advocated. In the long run, this will not only facilitate their maintenance, but also provide significant opportunities to realise new teaching-learning paradigms and support international co-operation in education.

Assuming new media ECs become available, teaching-learning can take on new forms. In particular, through use of technology to provide learning resources and the learning environment supporting learner-managed learning, we can shift towards the learning culture described earlier. The relationship between educators and postgraduates would correspondingly shift from teacher-postgraduates to facilitator-learner. Academics will spend less time teaching, and postgraduates will spend more time learning! More of staff efforts will be directed to

creating and maintaining high quality learning resources, and the necessary research, development and services to keep them in the forefront of their disciplines. The specific modes that new media resources make possible are outlined below.

Computer-Assisted Learning (CAL). Early the problems with CAL including restrictive test-based interfaces, rigid instruction structures, and labour-intensive authoring, have dissolved in the face of new media and development in multimedia authoring systems. CAL today supports more exploratory learning (navigation through the EC space) and freer interaction, putting the responsibility and control of the learning process in the hands of postgraduates.

Electronic Lectures. Teaching itself (teaching is not altogether eliminated) will drastically alter in form with the new media. Visualise a lecture that presents material not on the blackboard or overheated projectors but on the computer screens of postgraduates' laptops plugged into the communication network with hypermedia server serving multimedia AEs. Postgraduates screens will essentially mirror the lecturer's computer screen windows containing lectures outlines or notes for the lecture's use. The lecturer is interactive, not only in the traditional sense that postgraduates' raise their voice to interrupt with a question or comment, but also in the sense that students may point-and-click various parts of their screens (resulting in visual cues on the lecture's monitor) to raise questions or request further explanation or examples anonymously. This type of interaction can be significant for postgraduates who otherwise may be reluctant to raise questions for various reasons, including culture-related reasons (as in Eastern cultures where the regard for elders and teachers frequently translate into respectful silence or where consciousness of existing stereotypes leads to the same result). Visualise further that the entire electronic presentation, including the lecture's voice and perhaps a small video window of the lecturer, is being digitally recorded. In a sense it becomes CAL material (authored on-the-fly), which may be continually refined through post-editing and instantly accessible to postgraduates for playback at any convenient place and time!

Distance and Open Learning. Through wide-area networks (WANs), access to education will not be restricted by geographical constraints. Prospective postgraduates will be able to navigate through a menu of educational offerings, select pre-packaged programmes or negotiate a path through modular offerings, and register for approved study programmes. Each student's approved course of study (pre-packaged or negotiated) may be encapsulated in computer-managed packages with automatic monitoring of progress. Registered postgraduates will be able to access ECs from their workplace or residence, and the pace of learning will be under postgraduate students' control (significant for part time studies, for example). The electronic lecture described above, there is no need for students to be in the same room – the lecture may in fact be broadcast over a WAN, i.e. distance learning, while still retraining essential interactivity between lecturer and student. Part-time students need not worry about missing lectures because of timetabling constraints as they can be replayed at any time.

(Global) Group Learning. Computer networking makes it unnecessary for groups of people to be geographically collocated for group instructions. Group discussions can occur in real-time (computer conferencing) or offline (electronic discussions or e-mailing). Postgraduate students can communicate with lectures and tutors, ask questions or discuss some issues, obtain assignments, hand-in or demonstrate their work for assessment, etc. Frequently asked questions may be complied in the way that allow answers to be automatically generated without human intervention in response to common quires. Equally important, free format discussions with peers (who may be internationally distributed) can develop critical thinking abilities. Various levels of anonymity can be supported, so that opinions and issues, general or technical, may be raised without fear of reprisal or ridicule.

Other innovative teaching-learning models will no doubt emerge as the academic community and students gain knowledge and experience in using new media. It strengthens stem for having a single system that integrates diverse technologies including multimedia, CAL, computer conferencing and discussion, and distance teaching and learning.

Globalising Educational Resources. In principle, the educational programme design makes few assumptions about the size of the EC source, its coverage or physical location of resources. The source may be small (e.g. serving only a sub-discipline in one university) and localised (e.g. because of the language), or conversely large (e.g. covering multiple disciplines), distributed and internationalised (e.g. multi-lingual, involving many participating institutes). Distribution and globalising would bring additional benefits in two major respects:

Creation and maintenance of ECs. The academic community is a global community and subject expects are geographically dispersed. No single institution is likely to have faculty profiles that stretch the breadth of any given discipline. International participation in the creation and maintenance of ECs distributed close to where subject experts are available will help produce repositories that are more up-to-date, complete, richer in content and higher in quality.

Sharing the use of the distributed ECs. ECs on new media will additionally have the advantage of being shareable through the global communication networks.

As an academic community, we have used computer networks to set up distributed R&D resources, including abstract database, research data, programming tools, electronic discussion groups, etc. There is yet to be any significant effort, however, in higher education, which offers global education for students between 5 and 18 old through telecommunications.

Discussion. Before proceeding further, we will briefly summarise characteristics of the research process significant to education.

1. *Current Higher Education Practices.*

The research process is basically a learning process – a proactive activity of knowledge discovery and problem-solving through systematic self-study, observation, data collection, analysis, conceptualisation, hypothesis generation, experimentation, verification, critical judgment, and peer interaction. Learning occurs through *knowledge building* [15]*,* a process that subsumes knowledge transfer (teaching). Peer interaction does, in some sense, effect knowledge transfer, with researchers taking

turns to educate colleagues in their area of competence. Nevertheless, "teaching" in this sense is quite different from that of the structured settings. It is perhaps more accurately described as the facilitation of learning. The emphasis is clearly on learning and researchers take charge of and are responsible for their own learning.

Current practices in curriculum delivery, on the other hand, are: Teacher-led (with greater emphasis on pedagogy); Paced for the average; Calendar-defined; Scheduled; On-site; Centralised and socially isolated.

On the whole, the practises lead to a passive, reactive environment (from the learner's viewpoint). The student must follow prescribed topics, attend lectures/labs at appointed times, solve set problems exercises be certain deadlines, and generally try to learn at a pace predetermined by the teacher. Educationist mantras *"knowledge of how people learn and the application of the right techniques will make teachers more effective"* [2] further emphasise the teacher-centred approach. The emphasis on teaching techniques (pedagogy) typically led to courses with more structured teacher-led activities, which leaves students little time of their own to be proactive learners. This "teaching culture" of higher education is in stark contrast to the "learning culture" of research outlined earlier. Trapped in a teaching culture, the typical response to calls for increased productivity and reduced institutional costs is to increase the number of courses taught by a particular teacher and /or the number of students taught in a particular course. This issue, however, is not how much one teachers, but how much students learn!

If we want our young people to be intellectually autonomous, to adapt to changing circumstances, and to take responsibility and be accountable for managing change, we must create and foster a learning culture that is:

– Student–centred, not teacher-led;
– Knowledge building, not just knowledge transfer;
– Capability-based, not just knowledge-based;
– Open to negotiate learning, not simply prescribed;
– Pace for the individual, not the average;
– On-demand, not scheduled;
– Flexible, not calendar-defined;

– Extensively networked socially, not isolated;
– Distributed, not centralised.

2. *Education for Capability.*

Current educational and training frameworks focus on systematically making unfamiliar contexts and problems familiar through lectures, tutorials, assignments, drill-and-practice exercises, discussion of sample solutions, and other forms of instruction. Teachers often take great pains to produce pedagogical material and tightly guided activities to ensure students understand what is being delivered. Definitely, very capable individuals can result from this.

However, such capability is often limited to only that which the instruction system has made familiar for them. Stephenson calls this *dependent capability*. The unfamiliar, to the dependently capable, is a threat to self-worth (derived from formal certification of expertise, formal status and authorities they represent). Consequently, they avoid unfamiliar situations or try to couch them in familiar terms so that they may apply (inappropriately) tried and tested solutions. Habitually, they simply turn to superiors for guidance, instructions, and retraining. The *independently capable,* in contrast, view failure not as the threat to their expertise but as an opportunity to learn. Their expertise had been learned (not given) and they are therefore confident that they can adapt or extend it when necessary. Faced with unfamiliar, they will explore new ideas, act, take responsibility for their actions and learn from experience.

Education for capability is aimed at the development of independent capability. It embraces all of the following:

– The acquisition and analysis of knowledge;
– The exercise of creative skills;
– The competence to undertake and complete tasks;
– The ability to cope with everyday life;
– Doing all the above in cooperation with others.

Capability should be developed by giving students greater responsibility for their own learning and by requiring students to explore and explain its relevance to their own development and to the wider community.

3. *Negotiated Learning.*

A mechanism by which flexibility, student responsibility, accountability and public confidence can be affected is through a *"Negotiated Learning Contact",* involving the student, university and society/employer [3]. This process can be described as following: we envisage that students, in consultation with their lecturer/tutor, will plan and be responsible for their own learning. Academics will increasingly spend their time helping students, individually or in groups, to develop and execute their learning programmes. This will involve identifying specific learning objectives, desired competences, formulating/negotiating students' learning contracts, identifying resources required for a given programme, monitoring and assessing students' programmes and achievements.

Learning is achieved through a spiralling of student experience in planning, negotiating, monitoring, demonstrating and reflecting on their own learning. This can be effected through independent study, modular (credit accumulation) schemes, use of open learning materials, or learning from the variety of work-based experiences. The university must provide students with support for constant learning, access to expertise, access to specialist resources, opportunities for dialogue and peer support, rigour and quality assurance and accreditation. Current supporting frameworks, geared to teaching, are deficient.

4. *Learning Products: an alternative framework.*

Current widespread practice in curriculum design is based on defining a set of courses. A *course* traditionally is the packaging of subject matter offered indivisibly to students over one or two semesters through the serious of lectures, tutorials, laboratory exercises and assessed through assignments, laboratory work, written test and final examinations. The courses are either subject-based, problem-based or integrative, but nonetheless prescribed by teacher. Then they become the basic educational resources upon which the curriculum or the programme of study, meeting particular objectives is constructed.

There are three major shortcomings of this practice:

– The rigidity of course synopsis and prescribed activities commits curriculum delivery to largely a teacher-led mode of teaching-learning.

- The aggregation of educational material into courses and that they exist only in that form hinders any significant form of individualized or negotiated learning.
- A course in practice is also too large to be adapted quickly to advances in the discipline or changing market needs.

5. *Uncoupling Subject-Matter from Courses.*

An attempt can be made to devise a higher degree of independence between subject matter and courses that utilise them, generally focusing on the subject matter irrespective of how and if they are used in teaching – learning activities, i.e. uncouple the subject matter *in the form of educated resources [6]* from their aggregation into meaningful courses. The creation and upkeep of such resources and therefore not driven by course requirements but by the current body of knowledge spanning a discipline's *theories and practices* [3].

Particular course requirements may then be met by meaningful aggregation of these resources, e.g. vertically (as in traditional subject-based courses), horizontally (as in integrative courses), or mixed. A particular curriculum may be drawn on any of these types of construction. Furthermore, the number of different curricula may be constructed from the same pool of educational material.

Academics, in their role as builders and stewards of knowledge, create and maintain such educational resources – an activity not unlike that of publishing. However, traditional form of expressing and recording knowledge (textbooks, monographs, journal papers, etc.) may not be appropriate for learning units, and subject experts may need to develop alternative forms of expression primarily intended to facilitate learning.

These educational resources can be termed "Education Components" (EC). An EC is a coherent collection of subject-matter, and are three kinds of EC:

- *Awareness Element (AE)* – emphasises the exposition of theories, abstractions and facts of the subject matter;
- *Endeavour Element (EE)* – emphasises the know-how or skills acquisition;

- *Pragmatic Element (PE)* – emphasises the real life application of acquired knowledge and skills.

AEs, EEs, and PEs are complimentary. We can analyse the how course integrates the three kinds of EC to emphasise both knowledge and practice.

AE	Theories and models of language acquisition.
EE	Exercises on implementing languages; language laboratory exercises; library search; group (team) discussion and work; e-mail; report writing; presentation.
PE	Develop; stimulation model; role-play, realise through experience; to simplify assumptions.

ECs are topical with variable sizes dictated by topic coherence rather than arbitrary constraints (like the number of credit units or the length of a semester). ECs allow different programmes to package the subject matter in different ways to accommodate different educational goal, priorities and constraints. ECs provide flexibility in product delivery:

- Similar products but with different emphasis may be more easily constructed through the proper choice of component ECs;
- Different teaching-learning approaches can be supported, including problem based/multidisciplinary approach, learner-managed learning, negotiated learning, even traditional prescribed course delivery;
- ECs are more easily and quickly updated to reflect either market demand or technological change or both; products utilising ECs may be re-oriented by appropriate contents or selection;
- Topical relevance may be accounted for with new ECs and/or by dropping existing ECs;
- Special skills upgrading programmes or specialist knowledge of few technologies for professionals or practitioners may be tailored;

Special public awareness lectures series may be tailored, or course packages for use by private training centres may be customised. The ECs repository should exhibit the following characteristics:

- *Completeness*. Should cover all the relevant subjects and topics of a discipline. The material must be up-to-date and include coverage of open issues and current thinking and approaches being investigated by the research community. There must additionally be a balance of AEs, EEs, and PEs to ensure that they may be used to develop *capability*.
- *Quality*. The quality of each EC must be maintained to a high standard. ECs should accurately and correctly reflect current theories, concepts and facts, and be comprehensible, lively, stimulating and practical in content.
- *Richness*. ECs should be rich in its use of various information media and in the experiences designed for postgraduates. Experiences in particular should leave lasting impressions and help in formative processes of building character, attitudes, values, etc.

With regard to ECs, their expression in traditional paper-based forms such as workbooks, tutorials books, notes, programmed texts, and the like, augmented with perhaps audio and video tapes, films, etc., are inappropriate for large scale implementation (multi-disciplinary, organisation-wide, even global scale). They are not amenable to rapid distribution, revision and/or reorientation and will hinder and eventually strangle wide acceptance and further development of the learning culture they were designed to support.

A more comprehensive channel is needed that can integrate the various educational material and support their creation, maintenance, shared access and use on a large scale. It must allow incremental development and rapid revision to be made to keep pace expanding knowledge.

Such channel, itself undergoing rapid development, is available today. References is made to the medium realised through a union of computer, communication and digital media.

Problems, implications, and limitations

The scenario above represents quite substantial changes from the status quo and entails structural, systematic and cultural changes in higher education:

1. It moves away from and challenges the traditional role of higher education (and academics) as the controller of what students learn and as the intellectual capital of the nation.
2. It moves towards and favours the view of higher education institutions that are as open to user needs as public libraries, providing expertise, learning resources, quality assurance and support for learners who take responsibility and are accountable for their own learning.

A major change required is a shift in the disposition of academics towards teaching-learning. In the past, teaching-learning has implicitly taken a back seat to research and publications. If this attitude prevails, we will not see complete, rich and high-quality. ECs sources or any significant shift towards education for capability. Academics must value their education role as their research role. But this must also be echoed by the higher education establishment, particularly in matters of recognition and rewards which previously have been based almost exclusively on research and publications. ECs should be treated as seriously as publications. But this raises other important issues such as EC refereeing, peer review, copyrights, intellectual rights, etc. perhaps a learning unit repository should be managed and run much like a reputable journal.

Technology, such as the new media, is itself only an enabler. And while it can facilitate the realisation of the learning culture with all the characteristics listed above, there are inherent limitations and dangers:

1. IT generally has produced some remarkable and valuable applications that have changed our lives. There should be some concern, however, over its increasing use as a proxy of reality – we "talk" to electronic colleagues, immerse ourselves in multi-user dungeons or other electronic games, take a tour through a virtual museum, fly through virtual terrain, etc. It is indeed possible to create a learning environment that offers virtual labs, virtual specimens in virtual ecological settings, virtual objects of any kind that can be manipulated, studies from different angles, dis-

cussed, etc., or simulations intended to develop capabilities (e.g. flight simulation). But for all its impressiveness and realistic visualisations of reality (or fiction), they remain only the representations of reality. In education, which deals with life, this distinction is significant. Real education has not taken place until you have collected real specimen and manipulated real objects, or fly a real aircraft!

2. The new media can clearly make higher education more accessible. It overcomes the constraints of the physical campus (extends its presents, in a sense) and consequently allow a far greater number of individual educational opportunities they otherwise will not have. But with greater massification of higher education, there will be less individual facilitation, and the system can become just a paper chase to many who will do just enough to fulfil the minimal requirements to accumulate credits. Additionally, the extended presents of a facilitator through technology is still only a proxy and the effects of the real presence in regard to building enthusiasm and love for knowledge is largely lost. It is unclear to what extend these can be minimized by proper design of learner-managed ECs.

3. The Internet is a revolution in communication. A net user not only has access to information but is also a provider of information. Any information that anyone generates is instantly available to all other users. When uncontrolled freedom to generate information, however, there are serious questions concerning the quality and accuracy of information on the net. All users, their level of education notwithstanding, face the dangers of being misled, misinformed or otherwise influenced. Educated net users aware of the situation can perhaps exercise appropriate caution and critical judgement, but impressionable minds that are trying to educate through net, however, run a greater risk. Learning through accessing learning resources on net may develop in many the habit of accepting information on the net as accurate and authoritative.

Conclusion

Universities of higher learning must come to terms with economic realities. Education must be socially relevant and postgraduate costs held at acceptable levels. Boosting productivity to reduce costs is itself insufficient if the relevance of student learning outcomes is not critically examined and the associated educational processes revised appropriately. The desired postgraduate profile, that of an *independently capable individual* [10, 11,12, 13], cannot be realised within a teaching-oriented framework. This is likely to result in the dependent expertise. We may thus expect to see shifts towards a learning culture that is the student (postgraduate) – centred, where students increasingly take charge of and are responsible and accountable for their own learning.

Such a fundamental shift in education approach must also be supported by appropriate mechanisms and environment. As teacher-led activities by de-emphasised and learner-managed learning accented, traditional teacher-oriented packaging of prescribed subject matter into courses must be substituted with more open, self-assessing learning products (whose details contents may be negotiated or otherwise individualised). This poses an immense challenge to academics to re-engineer their business towards the production of such. The Assessment Unit Framework proposed in this research paper is the response to that challenge. Essentially, the approach is to maintain the subject matter (in small, newsworthy "chunks" called Units) separately from their aggregation into products. Specific products can then be assembled from appropriate Assessment Unit components quickly and with great flexibility. To complete the learning environment [4], the universities must then provide support that includes access to expertise, access to specialist resources, opportunities for dialogue and peer support, rigour and quality assurance, and accreditation.

Consequently, the programs for the second stage of higher education show that the tasks actually performed by them partially overlap, which can be attributed to the overall differences in the structure. The competencies analysis given in the educational standards shows that the study in the Master's program is not limited to traditional training skills.

Finally, as all these must be achieved within acceptable cost margins, we can expect to see new, innovated mechanisms.

1. First, self-access learning products, if manifested in appropriate forms, can incur high maintenance and distribution costs.
2. Second, the conventional organization of centralised examination tried to a physical campus limits access and consequently increases student costs. Both of these problems can be overcome through the appropriate use of electronic technologies. The use of new media, in particular, can facilitate the creation, maintenance and rapid distribution of examination recourses, extending the university beyond the bounds of a physical campus. Examination time can then be on-demand, flexible and extensively networked socially.

The Cybernetic Campus is an allusion to the emancipation of educational process from the bounds of a physical campus. But it is more than a hi-tech innovation. It is the reform of the "Knowledge Business" – the creation, stewardship, packaging, delivery and application of knowledge. It is an endeavour of higher learning that is integrated with, and accountable to, its host community.

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