Journal of Sustainable Development in Africa (Volume 13, No.3, 2011)
ISSN: 1520-5509
Clarion University of Pennsylvania, Clarion, Pennsylvania

TOWARDS SUSTAINABLE DEVELOPMENT: AN ASSESSMENT OF KNOWLEDGE MANAGEMENT INITIATIVES IN NIGERIAN UNIVERSITIES

Dorcas Ejemeh Krubu[1] and Solomon Gboge Krub[2]

[1]Department of Library and Information Science, Ambrose Alli University, Ekpoma-Edo State, Nigeria
[2]Top-Edge Personnel Solution, Rivonia, Johannesburg, South Africa

ABSTRACT

The objective of this study was to appraise the level of application of 21st century Knowledge Management (KM) principles and practices in Nigerian Universities. A study of a University was carried out in order to empirically situate generally observable trends. A KM assessment survey tool structured in the form of a Questionnaire, supplemented by observation and face to face interview was employed to assess the KM orientation of the University and provide an indication of how advanced it is in understanding and implementing KM. The assessment model was designed to cover four key areas, which are: Knowledge Awareness KM Tools, Knowledge Acquisition and Sharing and KM Audit. The evaluation of the responses had the goal of determining and placing the University in one of these three levels: 1. Basic and Rudimentary, 2. Knowledge Aware or 3. Knowledge Leveraging. Of the 11 Faculties in the University, 5 were randomly selected and 3 Departments were in turn selected from each Faculty. In each Faculty, 25 copies of the Questionnaire were administered, and the central administration had 25, making the grand total 150 copies. However, 144 copies were filled by respondents and retrieved making a response rate of 96%. A discussion of the findings was carried out which indicated that the University was at the Basic and Rudimentary level of Knowledge Management. The problems accounting for the low level of KM implementation were identified and x-rayed and the impact on sustainable national development highlighted. Based on the conclusions drawn, recommendations for improving the Knowledge Management capabilities of the University were proffered.

Keywords: Assessment of Knowledge Management; Knowledge Acquisition and Sharing; Knowledge Management; Knowledge Management Awareness; Knowledge Management in Nigerian Universities; Knowledge Tools

INTRODUCTION

One is not only in a new millennium, but also in a new era: the age of information and knowledge. Knowledge has become, more than ever, a strategic asset with the potential to be a source of competitive advantage for any institution.

The Organization for Economic and Cultural Development (OECD) and the World Bank have emphasized the significance of education and training as imperatives to participation in the speedily evolving modern global economy; for the development of 'human resources'; for up skilling and increasing the competencies of workers; and for the production of research and

scientific knowledge. In the UK's white paper titled *Our Competitive Future: building the knowledge driven economy*, a knowledge-based economy is defined as:

> … one in which the generation and the exploitation of knowledge has come to play the predominant part in the creation of wealth. It is not simply about pushing back the frontiers of knowledge; it is also about the more effective use and exploitation of all types of knowledge in all manner of activity

Knowledge Management – (KM) is part and parcel of the new theoretical discourse that has matured in relation to the central concept of the knowledge economy. Today, KM is a discipline that serves to deliver continuous performance improvement in any organization no matter its nature, goals or structural set up.

Globally, and in recent times, there has been a persistent call for the application of KM principles, as practiced in corporate organizations, to institutions of higher learning. These calls are justified given that at the university level, faculties face a rapid and constantly expanding universe of information pertinent to their field, and remaining abreast of these developments is becoming an ever-increasing challenge. Any institution of learning ultimately derives its relevance from its due attention to, and all embracing *commitment* to knowledge and it's enriching values. Therefore, in order to keep abreast of the rapid societal changes, educational institutions and systems at all levels, especially at the tertiary level, should seek to understand and master the art of how they can more effectively create, collect, disseminate, apply and share information. A university that fully understands that knowledge is its key asset should make it a priority to transform that knowledge so that it becomes an agent for change and societal transformation, and above all, sustainable development in all facets of life.

In the context of the above scenario, it is imperative for the university to develop an effective and efficient schematic for linking people, processes, and technologies in managing its core asset – knowledge. Thus, for any institution of higher learning, KM should be for it, *the synergistic interaction of information practices and learning strategies working together to improve knowledge, with the ultimate goal of optimally achieving institutional objectives.*.

There are two fundamental elements of KM that are critical in assessing the KM capabilities of an organization, in this particular case, institutions of higher learning. These are Knowledge Seeking and Knowledge Sharing attitudes and cultures. The factors, which can be considered as enablers of these two elements, are people, processes and technology. A vision of curriculum objectives, content development and subsequent learning outcomes supported by advances in research are pointers to Knowledge Seeking/Acquisition Behaviors, while availability of technology, databases and archives and ready access to, and dissemination of information, are embedded in the Knowledge Sharing Culture.

The trend in university administrations in the western world is to implement learning strategies that build from a knowledge management perspective. Universities in the developing economies, and Africa in particular should gear up if they must play a valuable role in helping African nations attain the millennium goals and vision of sustainable development by 2020.

It is against the background of the strategic importance of knowledge to overall societal growth that this paper seeks to assess the implementation of KM in Nigerian universities. The idea is to identify the gap between present realities in relation to the national objectives for broad-based development.

LITERATURE REVIEW

Hargreaves (2000) cited Drucker (1994) on the focus upon the transition to a knowledge economy, particularly with regard to its consequences for educational systems and schools. He predicts that while the development of literacy (including information technology (IT) literacy) and numeracy will remain part of the core curriculum, the school as an institution will come under increasing pressure to promote new forms of knowledge, namely: "meta-cognitive abilities and skills - thinking about how to think and learning how to learn; the ability to integrate formal and informal learning, declarative knowledge (or *knowing that*) and procedural knowledge or (*know-how*); the ability to access, select and evaluate knowledge in an information soaked world; the ability to develop and apply several forms of intelligence, the ability to work and learn effectively and in teams; the ability to create, transpose and transfer knowledge; the ability to cope with ambiguous situations, unpredictable problems and unforeseeable circumstances; the ability to cope with multiple careers - learning how to "re-design" oneself, locate oneself in a job market, choose and fashion the relevant education and training." (Hargreaves 2000)

Imam, Adedoyin, Jegede, and Adesanya, (2008) posit that KM is crucial to increasing the effectiveness of activities involving the creation, storage, manipulation and communication of information. Thorn, (2001) believes that KM is a wide-open area of study, that it is difficult to understand the implications of KM for an educational setting. This view is shared by many of the stakeholders in the universities in Nigeria, and it is an obstacle in the efforts to position higher institutions to fulfill the mandate of the overall goals of education. The challenges of properly implementing KM are real but not insurmountable. Kidwell, Vander, Karem and Johnson (2001) opine that KM should not strike higher education institutions as a radically new idea; rather, 'it is a new spin on their *raison d'etre"*. The same authors have developed a schema, which demonstrates how KM can be implemented in universities and the benefits that can accrue. It is adapted in this paper, and covers just two areas out of five. These are the crucial areas of Research and Curriculum Development.

Table 1. Application and Benefits of KM for the Research Process

Knowledge Management Applications	Benefits
A repository of: ▪ Research interest within an institution or at affiliated institutions ▪ Research results and funding of organizations with easy search capabilities to facilitate interdisciplinary opportunities ▪ Commercial opportunities for research ▪ Overview of internal services, resources and staff	▪ Increased competition and responsiveness for research grants, contracts, and commercial opportunities ▪ Reduced turn-around time for research ▪ Minimized devotion of research resources to administrative tasks ▪ Facilitation of interdisciplinary research ▪ Leveraging of previous research and proposal efforts ▪ Improved internal and external services and effectiveness ▪ Reduced administrative cost

Kidwell, J.J., Vander Linde, K.M. and Johnson, S.L., 2000

Table 2. **Application and Benefits of KM for the Curriculum Development Process**

Knowledge Management Application	Benefits
▪ Repository of curriculum revision efforts that includes research conducted, best practices, and lessons learned. ▪ Repository of content modularized and arranged to facilitate interdisciplinary curriculum design and development. ▪ Portal of information related to teaching and learning with technology, including faculty development opportunities, outcomes tracking, lessons learned, best practices and technology overviews ▪ 'Hubs' of information in each disciplinary area, including updated materials, recent publications, and applicable research. ▪ Repository of pedagogy and assessment techniques, including best practices, outcomes tracking, faculty development opportunities and research. ▪ Repository of analyzed student outcomes and evaluation updated each semester for lessons learned and best practices for all faculty. ▪ Repository of corporate relationships to identify curriculum design advisory task forces, guest speakers, adjuncts, case study sites.	▪ Enhanced quality of curriculum and programs by identifying and leveraging best practices and monitoring outcomes. ▪ Improved speed of curriculum revision and updating ▪ Enhanced faculty development efforts. Especially for new faculty. ▪ Improved administrative services related to teaching and learning with technology ▪ Improved responsiveness by monitoring and incorporating lessons learned from the experiences of colleagues, student evaluations, and corporate or other constituent input. ▪ Interdisciplinary curriculum design and development facilitated by navigating across departmental boundaries.

Kidwell, J.J., Vander Linde, K.M. and Johnson, S.L., 2000

There is a consensus among scholars and business managers that, in implementing KM, there are two models. One is the reactive model and the other is the proactive model. The first is where KM reacts to knowledge loss, particularly when an expert or key people leave, or to knowledge gain, through identifying learning from other projects and institutions. The second model is more productive, where the institution identifies its key knowledge in advance and puts in place strategies to manage it. Universities that are still rooted in the traditional/classical forms of university education, wherein learning is focused on the acquisition and perfunctory assimilation of existing body of information would operate the reactive model, whereas universities that embrace the dynamism that characterize modern knowledge-based societies would operate the pro-active model.

RESEARCH QUESTIONS

1. Is there a good understanding of the concept of KM from top to bottom?
2. Does the university have a clearly defined vision of KM?
3. Is KM part and parcel of the teaching and learning strategy?
4. Is there a system of ownership that ensures implementation and benchmarking of KM?
5. Is KM strategically utilized in Research and Curriculum Development?
6. Are there adequate ICT tools for the aggressive application of KM in continuously improving education?
7. To what extent does KM serve a vision of quality education that promotes the acquisition of 21st century skills?

RESEARCH DESIGN

The survey research method was adopted in this study. The instrument for data collection is the Questionnaire, supplemented by observation and face-to-face interview. Of the 11 faculties in the University, 5 were randomly selected and 3 departments were in turn selected from each faculty. In each faculty, 25 copies of Questionnaire were administered. 5 to academic staff in each of the 3 departments and 10 to non-academic staff who were selected randomly making 25 per faculty. For the 5 faculties, the total was 125. For the central administration, 25 copies of the Questionnaire were also administered. The grand total is 150 copies of the Questionnaire. However, only 144 copies were filled by respondents and retrieved making a response rate of 96%. Put differently, 144 respondents made up the sample of this study.

PRESENTATION OF RESULTS AND DISCUSSIONS

The Questionnaire was made up of 25 statements divided into five sections as indicated in the tables. Respondents chose responses that reflected their opinion. The result is presented as follows:

TABLE 1. Gender Composition and Status

Gender Composition	**Status** **Academic Staff**	**Status** **Non-Academic Staff**	**Total**
Male	56	37	**93 (64.58%)**
Female	32	19	**51 (35.42%)**
Total	**88 (61.11%)**	**56 (38.89%)**	**144 (100%)**

TABLE 2. Knowledge Management Awareness

S/N	Statement	Strongly Agree	Agree	Don't know	Disagree	Strongly Disagree
1.	People at all levels in the institution have a general understanding of the concept of 'Knowledge Management'	9 6.23%	8 5.56%	23 15.98%	94 65.28%	10 6.94%
2.	People in the institution are aware of the need to proactively manage knowledge	14 9.72%	69 47.92%	14 9.72%	31 21.53%	16 11.11%
3.	There is a vision for how KM should be integrated across all sections of the institution	1 0.68%	14 9.72%	21 14.58%	92 63.89%	16 11.11%
4.	Top management in the institution is committed to knowledge management	12 8.33%	57 39.58%	14 9.72%	42 29.17%	19 13.19
5.	Intellectual assets are recognized and valued	17 11.81%	21 14.58%	39 27.08%	46 31.94%	21 14.58%

Table 2 shows that more than 50% of the respondents did not agree with the fact that people at all levels in the institution have a general understanding of the concept of 'Knowledge Management' and another 47.92% agreed that the people in the institution are aware of the need to proactively manage knowledge while about 47% disagree with this view. The result shows that a strong vision for how KM should be integrated across all sections in the institution does not exist. This view is expressed by 63.89% of the respondents. Quite unfortunately, the table shows that intellectual assets are not recognized and valued. The implication of the above results, and the information gathered from interviews point to the fact that while there is an awareness of the need to implement KM, this is not matched by a good understanding of the concept.

TABLE 3. Knowledge Management Tools

S/N	Statement	Strongly Agree	Agree	Don't know	Disagree	Strongly Disagree
1.	Technology is a key enabler in ensuring that the right information is available to the right people at the right time	28 19.44%	116 80.56%	-	-	-
2.	There are adequate ICT tools for KM implementation	-	19 9.03%	12 8.33%	97 69.36%	22 15.28%
3.	There are defined responsibilities and budget for KM initiatives	-	-	38 26.39%	94 65.28%	12 8.33%
4.	There are systems in place to facilitate effective communication internally, nationally, and internationally	13 9.03%	76 52.78%	-	55 38.19%	-
5.	Sufficient manpower with the skills and competencies for KM implementation exists	3 2.08%	22 15.28%	31 21.53%	74 51.39%	14 9.72%
6.	Formal networks exist to facilitate dissemination of knowledge	31 21.53%	95 65.97%	6 4.17%	12 8.33%	-

From Table 3, it is copiously evident that all the respondents see technology as a key factor in information sharing. However, there is a wide gap between this knowledge of the importance of technology and its actual availability, as about 84% indicate that there are no adequate ICT tools for KM implementation. Also, over 70% disagreed that there are defined budgets for KM initiatives. About 60% mentioned that there are systems in place to facilitate effective communication internally, nationally, and internationally while a large percentage of about 60% indicated that there are no sufficient manpower with the skills and competencies for KM implementation. Good enough, about 85% claimed that formal networks exist to facilitate dissemination of knowledge. However, observations indicate that these simply basic and traditionally oriented.

TABLE 4 Knowledge Acquisition and Sharing

S/N	Statement	Strongly Agree	Agree	Indifferent	Disagree	Strongly Disagree
1.	In my section/department knowledge sharing is seen as strength while knowledge hoarding as a weakness	51 35.42%	73 49.31%	-	18 12.50%	2 0.14%
2.	Knowledge acquisition and knowledge sharing are part of your daily/weekly routine	13 9.03%	101 70.14%	-	34 23.41%	6 4.17%
3.	The knowledge input of commerce and industry is solicited and integrated into curriculum content	-	29 20.14%	13 9.03%	78 54.17%	24 16.46%
4.	The university hones its skills for generating, acquiring and applying knowledge by learning from other organizations' and institutions' learning processes	17 11.81%	43 29.86%	21 14.58%	46 31.94%	17 11.81%
5.	Seminars, workshops and HR training and development hold periodically and adequately	2 0.14%	38 26.39%	37 25.69%	62 43.06%	5 3.47%
6.	Key knowledge assets such as accomplished researchers, subject authorities and trail blazers is/are identified, recruited and retained	16 11.11%	49 34.03%	33 22.92%	40 27.78%	6 4.17%
7.	Effective cataloguing and archiving procedures are in place for document management (not necessarily electronic)	22 15.28%	74 51.39%	3 2.08%	32 22.22%	13 9.03%
8.	Individuals are committed to continual improvement and are constantly generating new ideas, research findings and creative inventions	21 14.58%	39 27.08%	6 4.17%	69 47.92%	9 6.25%
9.	Ideas for collaboration and joint research with other institutions and organizations are constantly reviewed and acted on when necessary	26 18.06%	41 28.47%	7 4.86%	66 45.83%	4 2.78%
10.	Multi-disciplinary teams are effectively formed and managed	-	28 19.44%	12 8.33%	81 56.25%	23 15.97%

In Table 4, responses to statements 1 and 2 indicate that there is a high level consciousness of the need to acquire and share knowledge. This sentiment is shared by a total 84.73% in the positive. But again, this is apparently only notional, as the commitment to actualize this is not reflected in, for instance, making it a practical policy of engaging commerce and industry and drawing upon their inputs to develop curriculum. Only 20.14% agree their input is secured, while an overwhelming total of 70.63 % responded negatively. With regards to HR training workshops and seminars, a total of 26.53% mentioned they hold periodically and adequately, while a total of 46.53% answered in the negative. The respondents who did not express any opinion constitute 25.69%. During face-to-face interviews it was discovered that many who did not express an opinion did so mainly because they could not confidently say whether the training was adequate or not. Also, a number of senior members

of the academic staff expressed frustrations at the slow manner in which top management goes about in closing the negotiations on proposals for collaboration with other universities and organizations which most often than not culminate in these efforts yielding no, or very little results. When it comes to establishing and making use of multi-disciplinary teams to drive knowledge acquisition and sharing, a total of 72.22% responded negatively while only 19.44 of the respondents did so positively.

TABLE 5. Knowledge Audit

S/N	Statement	Strongly Agree	Agree	Indifferent/ Don't know	Disagree	Strongly Disagree
1.	There is a senior level ongoing review of the effectiveness of knowledge management to the whole institution	1 0.69%	5 3.47%	20 13.89%	111 77.08%	7 4.86%
2.	The university systematically assesses its future knowledge requirements and executes plans to meet them	5 3.47%	25 17.36%	11 7.64%	94 65.28%	9 6.25%
3.	A review of the curriculum content of faculty and departmental courses is carried out regularly, at least once in two years.	-	36 25%	9 6.25%	78 54.17%	21 14.58%
4.	There is a regular appraisal of the relevance of knowledge and learning outcomes in the world of commerce and industry.	-	32 22.22%	6 4.17%	89 61.81%	17 11.81%

Regarding Knowledge Audit, about 80% say there is no senior level ongoing review of the effectiveness of knowledge management to the whole institution, and about 71% also negatively opined that the university systematically assesses its future knowledge requirements and executes plans to meet them. A large percentage of about 68% disagreed that there is the review of the curriculum content of faculty and departmental courses at least once in two years. Finally on Knowledge Audit, 73% signified that there is no regular appraisal of the relevance of knowledge and learning outcomes in the world of work and industry.

SUMMARY OF FINDINGS

The summary of the findings is carried out in line with the four areas in which the KM initiatives of the university are stratified. In the area of KM awareness, it is glaring that there is a relatively high level of awareness of the need to scientifically manage knowledge. This trend is repeated in areas where variables have to do with *intentions.* But this has not been captured in a well articulated vision that informs a policy document, and owned by designated personnel with the budget, tools and mandate to drive KM implementation in a deliberate and strategic manner. With regards to KM tools, the findings indicate a significant gap between the awareness of the relevance of technology and the desire to appropriate it to serve institutional purposes, and the availability and adequacy of KM tools, which are ICT based, to actualize it. Even though 60% of the respondents attest to the fact that formal networks for collecting and disseminating information exist; however,

observations made in the course of investigating the presence of these networks reveal that these are simply basic, and are inadequate to meet prevailing demands. Besides, the existing ones are not even being optimally utilized. In the area of Knowledge Acquisition and Sharing, what is evident from the survey is that aggregating the potentialities of group dynamics in achieving its search for knowledge is not a strong forte of the institution. It is no wonder that there is a serious dislocation between the requirements of 21st century skills and competencies by commerce and industry, and the learning outcomes that the curriculum content and teaching strategy can readily promote. The above is proof of the endemic feature that typically runs through the entire Nigerian Educational system, especially higher education. Knowledge Audit is the area in which the university least performed. The implication is that KM Audit, which is a most vital instrument for initiating change is not sufficiently carried out in a manner that can allow for accurate assessment of present KM strengths and deficiencies, and prediction of future knowledge needs, thus making any progress in the right direction impossible from the start.

Based on the results derived from the analysis of the data generated by administering the questionnaire, objective evaluation of responses got in the course of the face-to-face interviews, in addition to the direct observations and assessment of physical facilities on ground, the level of implementation of KM is clearly below the 40% mark. Thus, in grading its performance, in the ascending scale, as 1, Basic and Rudimentary, 2 Knowledge Aware, 3. Knowledge Leveraging, we conclude that it is operating at the first level of KM implementation which is Basic and Rudimentary.

IMPLICATION OF THE FINDINGS ON SUSTAINABLE DEVELOPMENT

In line with the "new growth theory" education and its core commodity - knowledge is unequivocally the pivot around which all forms of development in modern society revolves. Knowledge, as embodied in people (as 'human capital') and in technology, has always been central to economic development. But, in no other time in the history of mankind has its dividends been so passionately pursued. At no other time has the imperative of entrenching it in an enduring and flexible educational system, as the path to achieving economic growth been that gargantuan. Igberaese and Onyeaghalaji, (2009), affirm that 'KM is both an organic part of sustainable development and a potent instrument for furthering the process of development'.

In New Zealand, The Information Technology Advisory Group (ITAG), appointed by the Minister for Information Technology published a report entitled: *The knowledge economy* (Information Technology Advisory Group 1999). The executive summary of this report features the following assertions:

> More than 50 per cent of Gross Domestic Product (GDP) in the major OECD
> an economy is now based on the production and distribution of knowledge. We are
> leaving the Industrial Age behind and moving into the Information Age.
> In the US, Australia, the United Kingdom, Canada, Finland, and Ireland, the growth
> of the Internet and other related new technologies have become the catalyst for the
> creation of 'knowledge economies' …

Equipped with this central understanding and guided by neo-liberal theories of human capital, many western governments are aggressively restructuring their national education systems and redesigning the interface between universities and business. One can submit that the findings of this study are indicative of what obtains in the universities and institutions of higher learning across the nation without fear of over generalization. The findings of this study clearly reveal that as things presently stand with our educational system, with special emphasis on higher education, the Nigerian nation, and by extension majority of the African countries are not close to being positioned to compete in a global economy that is increasingly knowledge based. There has to be an overhaul and re-engineering of the system from bottom up. Given the symbiotic relationship between education - a nation's knowledge base - economic growth, the efforts currently aimed at eradicating poverty can only be a mirage if the educational status-quo is maintained.

RECOMMENDATIONS AND CONCLUSION

Given the prime importance of KM in aiding universities to meet their educational goals, institutions of higher learning should have an independent KM unit with the responsibility to engineer KM implementation across board and effectively use it as tool for the change management that our universities are in dire need of. KM Professionals who are well grounded in KM principles and processes should manage these units. Taking the current state of affairs into consideration, efforts at KM implementation should begin with KM Audit. This should then inform a clearly articulated vision of Knowledge Management employed as an instrument of performing on its core deliverable of engineering societal change and adding social and economic values towards sustainable development.

As things stand with our universities, the necessary changes in our universities cannot come about without change coming from the top. The right foundation for the school system to flourish has first to be laid. There is a most urgent need to reconstruct the educational system in a way that ensures and guarantees strong emphasis on the culture of enterprise and building skills of entrepreneurship. Equal emphasis on: the promotion of research; industry-education relationships, especially in higher education; workplace learning; and building a culture of life-long learning should be the bases for curriculum development.

A vision of education designed to provide 21st century skills can be best driven by KM implementation. To this end, investment in training teachers-educators in the use of Information and Communications Technology (ICT) is a fundament that cannot be over emphasized. The government would need to radically invest in ICT infrastructure complemented by investment in human capital. In the attempts by developing economies to bridge the digital divide, KM is an invaluable tool and our universities ought to lead the way.

In an age where progress is defined by knowledge, our institutions of higher learning cannot afford to pay lip service to KM. For KM advances and consolidates the horizons of educational growth. If anything, they should be at the forefront in robustly applying KM to serve educational goals. Thus, contributing handsomely to the quest for the kind of development that brings about real change in the lives of people across the various strata of society in Nigeria, and the African continent at large.

REFERENCES

Drucker P. (1994) - The age of social transformation. *The Atlantic Monthly,* 74(5)

Hargreaves D. (2000) - *Knowledge management in the learning society*. CERI, OECD.Paris.

Igberaese, D. & Onyeaghalaji, M. (2009). Knowledge Management for Sustainable Development: The case for Nigeria. *Communicate: Journal of Library and Information Science.* 11(1), 51-64

Imam, A., Adedoyin, S., Jegede, O & Adesanya, O. (2008) - *Library and Information Studies: An Introductory Text for Students in Tertiary Institutions*. Eagle Publishers, Nigeria.

Information Technology Advisory Group New Zealand (1999) - *The knowledge economy.* Available online at http://www.knowledge.gen.nz/

Kidwell, J.J., Vander Linde, K.M. and Johnson, S.L. (2000) - Applying Corporate in Higher Education. Educause Quarterly, Number 4. *In Information Alchemy: The Art and Science of Knowledge Management*. Ed. Bernbom, G. EDUCAUSE Leadership Series Vol.3. San Francisco: Jossey-Bass.pp.1-24 Available at http://net.educause.edu/ir/library/pdf/EQM0044.pdf

The Organization for Economic and Cultural Development (1996a) - *Measuring what people know: human capital accounting for the knowledge economy.* Paris: The Organization.

The Organization for Economic and Cultural Development (1997) - Industrial *competitiveness in the knowledge-based economy: the new role of governments. OECD Conference Proceedings.* Paris: The Organization.

Thorn, C. (2001) - Knowledge Management for Educational Information Systems". What is the State of the Field? Educational Policy Archives 9(47). November 19, 2001. Available online at: http://www.epaa.asu.edu/e