Capacity Building in Higher Education and Research on a Global Scale

Published by The Danish National Commission for UNESCO
Edited by Jens Jørgen Gaardhøje, Jens Aage Hansen and Erik W. Thulstrup

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17 – 18 May 2005 at the Niels Bohr Institute, Copenhagen
How Can Manpower Needs in Knowledge Based Economies Be Satisfied in a Balanced Way?

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Workshop Scope

Economic growth is increasingly tied to the supply of individuals with advanced research based education in science and technology (S&T). Countries that possess such resources will be able to attract research and development (R&D) activities of international companies and are likely to see a marked growth of new, domestic high technology industries.

However, many rich countries are unable to convince a sufficient number of their brightest young people to study the science and engineering subjects in high demand. This has led to an increasing import of young scientists from poor countries (brain drain). Most of these countries cannot afford the loss of their best talents and of the investments in their education.

The workshop aims at clarifying the problems related to capacity building at a high level in S&T in industrialized and developing countries and to explore solutions that ensure a balanced and ethically correct supply of this highly valuable "soft" resource. These solutions involve national initiatives in rich and poor countries, aid and development programs targeting capacity building in advanced S&T and the need for broader international cooperation and coordination.

The workshop is organized by the Science Committee of the Danish National Commission for UNESCO and the Niels Bohr Institute and is sponsored by the Danish Ministry of Education, the Niels Bohr Institute/ University of Copenhagen and the University of Aalborg, Denmark.

Foreword

by Torben Krogh, Chairman of the Danish National Commission for UNESCO

Through at least three – perhaps four – decades the traditional European and North American donor communities have given low priority to higher education in their foreign aid. The perception has been that such education is restricted to a rather limited and comparatively wealthy segment of the developing societies. Furthermore, one of the first main theories of foreign aid – the so-called trickle down effect – turned out to have major flaws when it came to the practical consequences.

Experience in recent years has shown, however, that higher education does play a vital role in the overall development of societies with a modest gross national product per capita. During the Workshop at the Niels Bohr Institute in Copenhagen 17 – 18 May 2005 – the result of which is published in this report – several examples were highlighted in this context. Also, the participants, contributing from very different professional backgrounds, presented very convincing arguments of a more analytical nature to underscore the point, that higher education should be given higher priority in the development cooperation.

Some donor agencies and countries – notably Germany and Sweden – have moved in that direction in recent years. Nevertheless, as it becomes clear from the proceedings much still has to be done. At the same time it is clear that such a process will not be without complexities. One serious threat, hovering over such an effort, will be the risk of brain drain. During the later years highly developed countries have suffered from lack of qualified, highly educated persons. To various degrees they have tried to make good for this by attracting such individuals from the developing world.

Here it has to be realized, however, that this phenomenon is closely related to lack of research possibilities, professional challenges and proper salaries in the countries of origin. Consequently, brain drain can not be countered just by a change of policy in the receiving countries. The most important factor

in this regard is reinforcement of the scientific and research activities in the developing countries themselves.

This point is forcefully underscored by the plurality of presentations in the proceedings. For us in the Danish National Commission for UNESCO it has been rewarding and eye-opening to be associated with this initiative. It is with great pleasure that I recommend this publication to everyone who is engaged in international development cooperation and more specifically in the thrust to strengthen the educational component in foreign aid – not least higher and research based education.

Table of Contents

Foreword

by the Programme Committee

Universities in many industrialised countries have a dilemma regarding developing countries. On the one hand faculty and students may be highly motivated to deal with exactly their problems in terms of education and research, and often the universities in their policies and strategic goals express solidarity with the South (the developing countries). On the other hand, the ministry under which the universities operate usually has no policy regarding development in general (not to speak of development in foreign countries), and there is no budget to sustain possible ambitions of this kind. Governments often have a strong interest in developing countries. For example, during times of overheated economies, governments may try to find badly needed talent by offering scholarships to top level foreign students or lucrative jobs to skilled graduates from abroad. This leads to a debate about brain gain by wealthy countries at the cost of brain drain in developing countries.

On this background the Workshop Programme Committee consisting of representatives from Aalborg University, University of Copenhagen and Roskilde University decided to organise a workshop to analyse the problems and seek ways and means of addressing the dilemma constructively. The workshop was sponsored jointly by the Danish National Commission for UNESCO, University of Copenhagen and Aalborg University.

The Programme Committee is grateful to speakers, sponsors and participants for making the workshop possible and thereby also this publication of the results from presentations and discussions. Special gratitude goes to the authors who took the time to write down their oral presentations and to the rapporteurs who took notes during discussions. The rapporteurs were Ingrid Karlsson from Uppsala University, Ole Mertz from Copenhagen University,and Laura Zurita, Birgitte Gregersen and Eskild Holm Nielsen from Aalborg University. We thank Helle Glen Petersen from the secretariat of the Danish National Commission for UNESCO who did an excellent job in pulling strings together before and after the workshop and getting this publication ready for print.

The Programme Committee has tried to summarise the outcomes of the

workshop and their own views in the introductory paper, and to make some conclusions. However, the reader is encouraged to consult the original papers provided by the authors in full in this booklet. We hope that this publication will provide food for thought regarding capacity building in higher education and research in general, and the role universities may play in bilateral and multilateral international aid programmes in particular.

Opening Address

by Jens Jørgen Gaardhøje, Professor, the Danish National Commission for UNESCO and the Niels Bohr Institute

Distinguished guests, ladies and gentlemen.

It is my significant pleasure to welcome you in Copenhagen for the workshop:

Capacity Building in Higher Education and Research on a Global Scale

organized by the Danish National Commission for UNESCO. The meeting has been sponsored by the Danish Ministry of Education, The University of Aalborg and the Niels Bohr Institute/University of Copenhagen.

There is a worldwide perception that continued economic growth in the world will increasingly be based on a new type of "raw material". This new resource cannot be dug out of the ground like gold and diamonds, but is tied to the ingenuity of humans. Indeed, in an increasingly complex world, development is intimately tied to creating new materials, methods, and products. The country that has the best conditions for creating new ideas and concepts also has the most direct route to gaining an edge in world competition to the benefit of its population.

Needless to say this requires individuals with advanced training and higher education and, in particular, with research training, principally within Science and Technology.

However, the "raw material" of the "knowledge based economy" is hard to come by and most countries experience a shortage of people with advanced training in research and development.

The threshold is low for trying to compensate for own shortcomings by "borrowing" from others by providing conditions of living and research that far exceed those that are available in the country of origin. This leads to the well know brain drain problem for some, to a brain gain for others.

The brain gain dilemma is complex and has many overtones related to economic development. Unchecked brain drain increases the divide between

rich and poor countries by draining poorer countries of their costly investment and hinders the development of many regions of the world. At the same time brain gain is for other countries a condition for maintaining a high standard of living.

Brain drain is thus a global problem which can only be overcome by building up sufficient capacities in the countries and regions. How to do that in a balanced way is the subject of the present workshop. I hope that our discussions in the next two days can help clarify the problems and issues at hand and perhaps also provide some guidelines for how to act in the future.

I hope that the participants will be inspired buy the atmosphere of this venerable institute founded by Niels Bohr.

Bohr as you know, a passionate believer in the open world and the free exchange of ideas, founded an institute based on international cooperation, running an extended visitor program here at Blegdamsvej, most of whom returned to their home countries and build up new areas of science, often founding what we today would call centers of excellence .

I invite you in the break to take a look at the pictures framing this room.

I trust that our discussion will be equally far reaching and lively as the many that have taken place and still take place here on physics and quantum mechanics, and …. that they will make up for the hard benches that have changed little since the 20'ties.

On behalf of the organizers, Erik W. Thulstrup, Jens Aage Hansen and myself, I wish you all a good and productive workshop.

Opening Address

by Henrik Toft Jensen, President, Roskilde University, Danish Rectors' Conference

It is a pleasure for me to address this workshop "Capacity Building in Higher Education and Research on a Global Scale".

In a fast developing world it is important to be aware of and to create actions to meet manpower needs in Science and Technology.

First of all it is universities and scientists who should be active in this field and as the chair of the International Committee of the Danish Rectors' Conference I can inform you that Danish universities have a current project on building universities for the future. This is in response to internal demands for being live and active academic institutions working on the leading edge in research and higher education. And it is in response to external demands from government, civil society and industry regarding partnerships in developing a knowledge society, e.g. in terms of advanced development and use of science, technology and innovation.

Actions from international organisations are very important, and I would like to stress that capacity building and North-South relationship is on the agenda in the two global university organisations "International Association of Universities" and "International Association of University Presidents" as well as in many regional university organisations such as the European University Association.

I would like to stress that global organisations are very important in this capacity building. Therefore, it is promising that representatives from The World Bank, OECD and UNESCO are participating in this conference and the workshops. This will contribute to secure the global dimension.

But let me return to researchers and universities active in this capacity building.

International and mutual interactions as well as establishment of partnerships across traditional borderlines (cultural, academic, geographical, and technical) are necessary for universities to meet future and global demands. There is a long tradition for doing so, in particular between universities in the industrialised world. Interaction between countries and universities in the

industrialised and in the developing world is much less obvious and not always mutually beneficial and productive. But over the past decade there are some interesting examples of Danish university involvement in capacity building in the 3rd world.

One example is the ENRECA (Enhancing Research Capacity in Developing Countries) with a budget of app. US $ 8 million/y and about 40 projects running a project contributing to capacity building and partnership between North and South. The ENRECA evaluation in 2000 also identifies a dilemma between doing research and building capacity to do research and use the results. The weaker the economy, the more need for capacity building before real research can be done. Occasionally, this places the donor country researcher in a difficult position, because the demand at home is publishable results from real research, while time spent on education and tutoring does not create academic merit. But institutional and educational capacity building is a prerequisite for research, and therefore we hope that the donor agency DANIDA (Danish International Development Agency) will increase budgets to allow for a combined building of institutional, educational and research capacity. Danish faculty and graduate students have performed very well and with great enthusiasm in ENRECA projects and overall the evaluation in 2000 was very positive. Universities have contributed financially in terms of time and use of equipment.

Another example is Danish University Consortia for Environment and Development, DUCED-I&UA for Industry and Urban Areas, and DUCED-SLUSE for Sustainable Land Use and Natural Resource Development. These two consortia comprise some 20 universities in Botswana, South Africa, Thailand, Malaysia and Denmark and the annual budget from the donor (DANIDA) was app. 4 million US $/y. Universities contributed a similar amount of resources.

The DUCED programme was designed for education capacity building (curricula), but in order to install new capacity at universities and maintain the enthusiasm of faculty and graduate students, the research component increased over time in terms of several Phd. students enrolled and forming a core group of capacity builders.

What can been learnt from the ENRECA and DUCED programmes is very important.

The programmes have been successful in building capacity, in particular when combining institutional, educational and research aspects in the programmes.

The programmes have been very cost effective, but obviously the

institutional and educational capacity building process in recipient countries requires extra input from donor agencies. The Danish universities cannot absorb this in their budgets which are made for national activities so far.

The experience gained by Danish universities is of high value for both Danish students and faculty in terms of preparing for careers in Denmark and internationally. So in effect, capacity building has taken place both in South and North and has been mutually beneficial.

The simple conclusion is that Danish universities are ready for more of that type of experience and international networking, simply because it means providing the foundation for knowledge societies, and the basis for global prosperity, democratic development, and reduction of poverty.

This workshop addresses capacity building in higher education and research and there is focus on the potential conflicts of interest between the rich and the poor countries. Universities in both worlds provide the ideal platform for an important continued dialogue, oriented at creating action towards mutually beneficial progress. A dialogue orientated at creating of a mutually beneficial roadmap and define action to achieve progress. The workshop also includes donor institutions and university representatives from different countries. The ground seems to be laid for a constructive exchange of experience and for shaping some of the foundation necessary to move ahead.

On behalf of the Danish Rectors' Conference I look forward to the results from this workshop. I hope mechanisms for increased future university involvement in capacity building and for better interaction between universities and donor organisations will be some of the results of your efforts.

I wish you two successful days in Copenhagen.

I Recommendations

Capacity Building in Higher Education and Research: A Key Component of Efficient Global Development

by the editors: Erik W. Thulstrup, Jens Aage Hansen and Jens Jørgen Gaardhøje

Abstract

This paper discusses development through capacity building in higher education and research (CBHER), especially how to achieve this in the context of the UN Millennium Development Goals (MDG). It is argued that investment in CBHER may be a direct and efficient route to economic development. Based on the presentations and discussions during the Workshop at the Niels Bohr Institute in Copenhagen, May 17-18, 2005, nine conclusions are developed and presented in this introduction to the Workshop Proceedings by the Programme Committee.

Paradoxes in development and globalisation

It is becoming increasingly clear that the fast growth of three groups of people will dominate international relations during the coming decades. The three groups are:

- The fast growing group of old, relatively wealthy people in Western countries and Japan

- The group of increasingly wealthy and productive younger people in successful developing countries like China and India, and

- The group of young people in high-birth-rate and low economy countries, who are only given few (educational) opportunities for a better life and are increasingly dissatisfied and bitter; this unfortunate situation is a significant part of the root system of terrorism.

At the same time, the group of desperately poor, for example in Africa, is not likely to be reduced fast enough. Globalisation, that has been so useful for China and India, does not seem to help Africa nearly as much.

Thirty years ago South Korea and Singapore were poorer than many African countries, but through a major educational effort that made it possible for them to use up-to-date technologies efficiently, they were able to create fast economic development and have long ago managed to drastically reduce or eliminate poverty. Surprisingly, their successful strategies were not copied much by other developing countries or donors, at least not until China and India started doing so on their own. But the recent success of these huge countries is hard to overlook. Other large developing countries, like Pakistan and Brazil, are trying to follow similar strategies and there are indications that also these countries may be successful, even without much help in the form of foreign aid.

Economists have for years tried to demonstrate a clear relationship between development aid and actual economic development. However, it seems hard to find an obvious correlation between the two (see, for example, R. Rajan in the Dec. 2005 issue of Finance and Development). In the case of Danish aid, the correlation may at times seem negative. Many of the countries, for example in Africa, that receive Danish aid have experienced a striking lack of efficient development, while countries, that many years ago stopped receiving Danish aid, including China and India, recently have been much more successful in creating economic development and reducing poverty. Would Denmark be able to help poor countries in Africa by getting out of the aid business? Several economists would agree, but there may be a better way.

Building capacity in higher education and research

What are the main differences between the traditional aid driven development strategies, for example those supported by Denmark, and the obviously successful ones used by China? One striking difference is that the former tries to make up for the uneven and unfair division of wealth in many developing

countries by attempting to support the poorest part of the populations in these countries directly. The latter gives high priority to the creation of wealth, with less initial emphasis on how it is divided. However, experience, e.g. from Singapore and Korea, shows that the poorest part of the population also may benefit significantly from this strategy, while attempts to divide existing wealth more fairly have led to disasters in Sri Lanka.

Another striking difference is the emphasis placed on higher education, especially within science and technology, in the successful developing countries, from Singapore to China. In contrast, the traditional donor guided development strategy puts emphasis on basic (primary) education. While there is no doubt about the usefulness of good primary education, it is not enough to support economic development. Both China and India are these years demonstrating that clever use of research based modern technologies has been able to create economic development much more efficiently, as it was shown earlier by Singapore and South Korea. These successes have been noticed in South Asia: India has started a billion dollar project with the purpose of strengthening engineering education at the "second level" of higher education institutions, Pakistan has increased funding for university research in Science and Technology by eight thousand per cent(!), and Bangladesh is negotiating a large World Bank loan for S&T university research.

The by far largest development aid project these years is the Chinese development efforts in the backwards, Western part of the country. Not surprisingly, the highly successful and wealthy universities in the rich Eastern China are among the main players in these efforts. In the Danish aid philosophy, higher education is still often considered a luxury – it is felt that the educational needs of developing countries are limited to primary education and vocational training. This seems still to be the case, even after the development banks have started to recognize the key role of higher education for economic development. However, discouraging developing countries from gaining access to knowledge at highest levels, for example high technology knowledge may result in a new form of colonialism and this is hardly what Denmark wants!

Higher education is not only useful for the economic development. It may also have a significant political impact by creating cadres of informed and thinking young people in support of democratic reforms. There is little doubt that politics is important, and there is some indication that democratic systems on the whole are more efficient in reducing human suffering than other political systems. Western donors like Denmark have for years tried to strengthen democratic and peaceful developments in developing countries

by directly supporting democratization efforts, but often with mixed results. However, many examples show that if young people are given useful higher education at an international level, they will be both able to and motivated for supporting democratisation efficiently, and will be much less tempted, for example, to join terrorist groups.

The civil war in Sri Lanka, that has now lasted over twenty years, was to a large extend triggered by an unfair system for access to higher education. Many young people found a life as fighter or even terrorist more attractive than the only alternative that was available without higher education, a life as a poor farmer. This was recognized many years ago in Sri Lanka, and university enrolments were expanded drastically. However, most of the new educational opportunities were in low-cost subjects that did not lead to employment, especially in the humanities. The country now has to struggle, not only with a civil war, but also with almost 30,000 unemployed and unemployable university graduates (while there still is a shortage of engineers in the country). This has not created political stability or economic development.

Using the capacity

It is not enough to establish capacity, it must also be used. In order to create development, higher education and research must be useful for society and lead to good employment opportunities for the graduates. The universities must be part of the surrounding society and not isolated ivory towers. Too often, donor or development bank funded university projects have attempted to strengthen the academic standards at universities in developing countries, with little regard to the impact on society, as illustrated in Fig. 1.

Figure 1. Society and the ivory tower (university) before (left) and after (right) a traditional, donor funded university capacity building project. Clearly, the situation in real life has not changed much (Kornhauser and Kos, 1992, by permission).

Today "knowledge sharing" is becoming a key phrase – those who have useful knowledge (e.g. good universities) must share it with those who need it (e.g. industry, the public sector, or the public in general, see Box 1). This is not easy: many developing country universities are completely unprepared for such demands, and even local knowledge users, for example industry, are frequently very hesitant to let students invade their facilities. Fortunately, those that have accepted it are usually very satisfied with the performance of the students.

Box 1. Beauty without Pain in Nairobi

In the mid-1980s the Chemistry Department at the University of Nairobi, Kenya, started encouraging groups of undergraduate students to carry out their research projects on real life problems. One group analyzed the heavy metal content of eye liners in the local market; especially women of Indian origin used these in large quantities. The students found that the amounts of heavy metals in some of the products were extremely high, and actual health problems could be attributed to these. Other eye liners in the market were completely safe, at least with respect to heavy metals. This would have been just another research project if the local media had not noticed the results. The risks related to the heavy metal content became front-page news in the newspapers in Nairobi and this publicity helped save many women from unpleasant injuries.

Most Danish universities have overcome such knowledge sharing problems and work successfully with industry and other knowledge users. The important integration of education, research, and real life applications has actually been accomplished at modern Danish higher education institutions, e.g. at the universities at Aalborg and Roskilde where problem based learning is practiced at all levels. Using academic capacity in practice is a key competence, which many developing country universities still lack. If they could obtain such skills, development might benefit immensely.

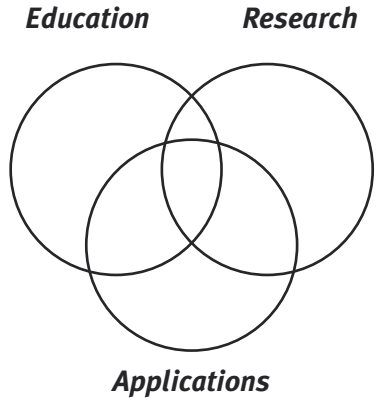

Figure 2. Integration of education, research and real life applications as it is practiced at modern Danish universities. Many developing country universities have not yet accomplished such integration, although it is essential for knowledge sharing.

Workshop observations on the development process

The workshop looked at capacity building in higher education and research for fair global development from different stakeholder positions, e.g. international institutions, industry, donor agencies and universities, representing both donor and recipient countries. In order to put the entire workshop outcome in context, the main points of each speaker are here summarised briefly. This allows for the attempt to conclude the results of the two day exercise at the end of this article. While neither workshop nor discussions were focused on the Danish situation in terms of aid policy or university involvement, Denmark did serve as benchmark in the discussions during the workshop and is used as such in the conclusions.

Industrial viewpoints are expressed by Lene Lange from Novozymes. Growth economies such as in China, India and Brazil were mentioned as attractive to high tech industries due to growing markets, educated labour and good infrastructure. Win-win situations are likely to occur without intervention from international aid agencies. In poor developing countries there is less immediate interest in investment from the high tech industry, which means that there is an urgent need for aid agencies to target action on capacity building and technology transfer. Training of young talents abroad is not necessarily brain drain, but may also be a way of long term capacity building, because many trained individuals return with important, international academic and industrial links. Clean production in for example the agro-industrial sector is

but one example of interesting drivers in developing countries that could also attract also foreign industrial investment for win-win projects.

By a virtual analysis of the university of the future and acknowledging the growing need for knowledge, Jamil Salmi from World Bank challenges both industrialised and developing countries to handle a number of daunting, but crucial tasks. These include expanding the capacity for tertiary education, reducing inequality of access, improving quality and relevance of education, and installing more effective governance and management systems. Establishing partnerships with and use of experiences from foreign universities that are leading within learning strategies is one way of reforming tertiary educational sectors. Quality control based on evaluation of graduate competency is another, and flexibility in adaptation to new needs of the country a third.

Michael Oborne from the OECD focuses on highly skilled immigrants in OECD countries. There is a clear tendency for several of these countries to attract, educate and keep talent within their borders. But changing conditions make it possible for talent to be trained at high quality universities in for example China and India. Multi-national companies are other active agents of change in that they transfer knowledge and "skilled human capital" across borders according to markets and opportunities. Common to all countries that want to improve development and create a better living for their citizens are that they must create a knowledge based economy, i.e. make long term investment in human capital.

Julia Hassler from UNESCO discusses the mobility of highly skilled manpower, including phenomena such as brain gain, -drain, -return, -exchange, -wastage, etc. She suggests the consideration of brain circulation with potential benefits to all countries involved. International organisations should play a positive role by assisting the mobility of workers in science and technology and maximise benefits. The "diaspora" concept (expatriate skilled capital considered an asset to the home country) together with efficient networking may be an attractive new development tool. She points out that members of the UN family must include in their millennium goals for every country the development of human resources to the highest level. International organisations should be prime movers in the process of connecting educators in a global network to reach the final Millennium Development Goal, i.e. "Global Partnership for Development".

Tomas Kjällqvist from the Swedish International Development Agency provides evidence of the effect of Swedish support to developing countries through a strengthening of their research capacity, specifically at the

institutional level. It happens on the background of a rediscovery among international donors of the significant role of science and technology for development. Cooperation between Swedish and foreign universities has strengthened both local research environments and international scientific information exchange. The aspect of coupling education and research was one reason to concentrate Swedish aid to universities rather than other research institutions. Strengthening of national research policies will be a target for Swedish capacity building programmes, and donor coordination in this field is seen as important.

Assisting the mobility of some 50,000 academics (students, faculty and other scientists) each year is one of the results of the German Academic Exchange Service (DAAD) as described by Michael Harms. It is a two-way programme, but the emphasis is on incoming academics (to Germany). The independence of DAAD from the donor community is interesting in terms of programme design and development of new instruments in capacity building within higher education, e.g. demand driven courses and research projects, bottom-up institutional capacity building, and alumni institutions for continuity beyond project periods. The return to the home country of skilled human capital is considerable.

Leiner Vargas describes the Sustainable Development Strategies for Central America (SUDESCA), a project financed by DANIDA (Danish International Development Agency) as part of the ENRECA (Enhancement of Research Capacity in Developing Countries) Programme during the period 1996-2006. He emphasises the change from at first research only to a more balanced process involving both education and research. Learning by doing in interaction with local companies is an essential element of success in project implementation. One of the conclusions by Vargas is that university capacity building should concentrate on issues where society can benefit, not only economically but also in terms of general acceptability. The duration of capacity building programmes is crucial for their success. Trust takes time to build from scratch and long term financing must be available for capacity building (CB) projects to succeed.

P. Agamuthu describes Globalisation of Tertiary Education and Research in Developing Countries based on experiences from the DANCED/DANIDA funded capacity building project involving Malaysian and Danish universities. The project focused on industry and urban areas and lasted from 1998-2004. Malaysia belongs to the group of growth economy countries and this may partially explain that the participating Malaysian universities in only 3 years were able to change learning paradigms, acquire new EU funded projects

in curriculum development, and establish numerous linkages for career development and scientific collaboration. Agamuthu stresses the mutual recognition of cultural and socio-economic differences as positive and mutually beneficial opportunities for both South and North, i.e. the exchange must be two ways and funding must somehow be matched to achieve this balance in the longer run.

Henrik Secher Marcussen reports on experiences from an ENRECA project in Burkina Faso, 1994-2006. He reviews the project in regard to the initial targets set, but also in a wider context of development in a globalising world. This leads to some key questions and observations that are relevant to capacity building (CB) projects like ENRECA and to aid programmes in general. 1) National rather than donor priorities should determine topic and scope of CB projects. 2) Aid programmes aiming directly at poverty reduction would usually not offer the right context for good national CB programmes; high quality and technologically advanced research and tertiary education may have to be targeted separately. 3) The donor country may have to involve both its aid agency and its ministry for science, technology and innovation when planning and negotiating CB programmes for priority countries.

Stig Enemark reports on the planning of a recent CB project from Mozambique. The project is not likely to become funded and implemented due to lack of mutual understanding and coordination between the key stakeholders. It is argued that capacity building in higher education and research should be part of university strategy portfolios and be supported by relevant stakeholders such as donor agencies, ministries, trade and industry. It is important that such capacity building activities be seen as mutually beneficial, i.e. not only as key drivers for societal development in the recipient countries, but also as necessary for building relevant international capacity and institutional innovation in donor countries.

Conclusions

Base on the presentations and discussions during the workshop the following may be concluded:

- CBHER should more specifically enter the MDG
- CBHER is a prerequisite for skilled human capital and economic development

- Investment in CBHER should preferentially be separated from other aid issues, at least initially
- The poorer the economy, the longer support for CBHER is required
- Stakeholder commitments and facilitating infrastructures are vital for CBHER
- Capacity building must also target concrete societal needs
- International partnerships at the university level improve global trust and fair trade
- Mobility and staff exchanges are needed to enhance CBHER and create mutually beneficial brain gains
- Efficient CBHER at universities in the South often requires a new-mind set and creative actions by stakeholders in the North, including governments.

The UN Millennium Development Goal (MDG) number 8 prescribes "global partnership for development". The workshop provides ample evidence that this requires more specific mention of capacity building in higher education and research. While "universal primary education" has its own MDG number (2), it has to be recognised that higher education and research has become a basic need, not only in industrialised countries. Also in developing countries a considerable effort is requited, if they want to participate in the new global economy.

Several examples presented by speakers and participants showed that economic growth is necessary for development to take place, and that higher education (skilled human capital) and research are key factors for any country to realise economic development.

Investments in higher education and research serve a long-term development goal. Thus it may have to be initially separated from other concerns in order not to confuse matters, e.g. by not asking for poverty reduction as an immediate outcome, although it is on the top of the list and absorbs the majority of donor concerns.

Growth economies are different from developing country (stagnation) economies and the ways to implement capacity building in higher education and research will have to differ accordingly. The poorer the economy, the longer the process may have to last. A staggered approach will possibly benefit both donor and recipient country. Important ingredients in the process are mutual trust building between partners (e.g. universities) in South and North, as well

as agreed quality assurance measures (e.g. the use of output and competency building rather than input as key parameters).

Stakeholder co-ordination and facilitating infrastructures are necessary in both recipient and donor countries for CBHER projects to succeed. Stakeholders are, for example, government, industry, trade, and universities.

University capacity building should also target concrete societal needs especially by making them part of problem based learning (Fig. 2). This is beneficial for all parties involved, from the students in the learning process to the problem provider who will benefit from new information and understanding of the problem and may even find new innovative solutions.

International partnerships between donors and developing countries at the university level help create mutual trust and prepare for future trade relations. Understanding between new generations of leaders, democratic development, and fair deals between friendly partners rather than edgy and alienated competitors may be some of the outcomes of cooperation at this level.

Mobility and scholarships are vital instruments in capacity building in higher education and research. Sweden and Germany offer role models in this connection worthy of further analysis and possible use in other countries. One of the interesting observations from the presentations at the workshop is that increased mobility reduces the brain drain problem, because in a long term perspective there will be sharing of knowledge and skilled human capital. Mobility is given high priority in a variety of programmes within the EU, but only for the 25 member states. A comprehensive programme for mobility between the EU countries and the rest of he world, especially the developing world, is missing. It might be possible for North European countries to create a basis and a model for increased mobility between North and South. Among other, the alumni model of the German DAAD programme may deserve further analysis in terms of mechanisms, costs and development impact.

Capacity building at universities in the South through partnerships must be part of the development strategies of universities in the North, if researchers and educators are to become fully engaged. Support from ministries, other agencies and private stakeholders in the donor country will be necessary, but is essentially absent in many countries. This is, for example, the case in Denmark, in contrast to the official Danish government strategy for participation in global economic development (published April 2006 under the title "Progress, Innovation and Social Security"). There is a need for an improved understanding of the new global situation, and priorities must be accordingly revised, if aid programmes are to produce a long-term increase of human capital in developing countries as the backbone of sustainable economic development.

II Perspectives of the International Organizations and of Industry

Developing Countries and the Global Knowledge Economy: New Challenges for Tertiary Education

by Jamil Salmi, Coordinator of the World Bank's network of tertiary education professionals

Abstract

Developing countries face significant new challenges in the global environment, affecting not only the shape and mode of operation but also the purpose of their tertiary education system. Among the most critical dimensions of change are the convergent impacts of globalization, the increasing importance of knowledge as a main driver of growth, and the information and communication revolution.

Both opportunities and threats are arising out of these new challenges. On the positive side, the role of tertiary education in the construction of knowledge economies and democratic societies is now more influential than ever. Tertiary education is central to the creation of the intellectual capacity on which knowledge production and utilization depend and to the promotion of lifelong learning practices. Another favorable development is the emergence of new types of tertiary institutions and new forms of competition, inducing traditional institutions to change their modes of operation and delivery and take advantage of opportunities offered by the new information and communication technologies. But this technological transformation carries also the danger of a growing digital divide among and within nations.

At the same time, most developing and transition countries continue to wrestle with difficulties produced by inadequate responses to long standing challenges faced by their tertiary education system. Among these unresolved

challenges are the sustainable expansion of tertiary education coverage, the reduction of inequalities of access and outcomes, the improvement of educational quality and relevance, and the introduction of more effective governance structures and management practices.

In this context, the presentation will focus on the role of tertiary education in building up the capacity of developing countries to participate in the global knowledge economy client countries.

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Introduction

Welcome to the university of the future. All visitors will be greeted by a robot receptionist. Incoming students will receive a free ipod, a Blackberry, a laptop and a bicycle. Students in need of financial aid will compete for scholarships auctioned online on Ebay. In the university of the future, each student will have an individualized program to suit his / her specific career plans or study interests. Courses will be systematically redesigned every two years. The validity of degrees will be only five years. Most students will enroll at the same time in at least two or three tertiary education institutions to get credits towards their degree. Most courses will be online, through dynamic interaction with web-based cognitive tutors based on artificial intelligence. In the university of the future, there will be no physical library or laboratories, only e-libraries and i-labs. Daily communications from the university administration will be transmitted through SMS sent directly to the students' cellular phones. Students who graduate on time will get a $500 cash reward, whereas graduates who don't find a suitable job within six months of graduating will be reimbursed the full cost of their studies. To stimulate institutional responsiveness and relevance, the university president will tax each department at the beginning of the academic period and award the most innovative department a one million dollar prize at the end of the period. Professors will receive a bonus based on the labor market outcomes of their students. Overall, the university will receive only 10 per cent of its income from the government. The most sought after program will not be the MBA

anymore, but the Master in Fine Arts recognized for creativity skills imparted to future industry leaders.

While this description of the university of the future may seem like an improbable science fiction dream to some, or a terrifying nightmare to others, each element mentioned above can actually be found in some form among today's universities. These futuristic features are symbolic of the rapid transformation affecting tertiary education in the industrial world. In the past few years, many countries have witnessed significant transformations and reforms in their tertiary education systems, including the emergence of new types of institutions, changes in patterns of financing and governance, the establishment of evaluation and accreditation mechanisms, curriculum reforms, and technological innovations.

But the tertiary education landscape is not changing at this impressive speed everywhere. Most developing countries continue to wrestle with difficulties produced by inadequate responses to long standing challenges. Among these unresolved challenges are the sustainable expansion of tertiary education coverage, the reduction of inequalities of access and outcomes, the improvement of educational quality and relevance, and the introduction of more effective governance structures and management practices.

And yet, having strong and dynamic tertiary education institutions has never been as essential for developing countries faced with the need to accelerate economic growth and reduce poverty. In this context, the paper focuses on the capacity building role of tertiary education. It starts by recognizing the importance of knowledge for developing countries in the pursuit of better economic and social outcomes. It then outlines the changing education and training needs arising from increased reliance on knowledge. The third section describes the rapidly evolving tertiary education landscape. In the final section, the paper examines the opportunities and challenges brought about by these new developments.

Growing importance of knowledge for developing countries

Economic development is increasingly linked to a nation's ability to acquire and apply technical and socio-economic knowledge, and the process of globalization is accelerating this trend. Comparative advantages come less and less from abundant natural resources or cheaper labor, and more and more from technical innovations and the competitive use of knowledge. Today, economic growth

is as much a process of knowledge accumulation as of capital accumulation. It is estimated, for instance, that firms devote one-third of their investment to knowledge-based intangibles such as training, research and development, patents, licensing, design and marketing. In this context, economies of scope, derived from the ability to design and offer different products and services with the same technology, are becoming a powerful factor of expansion. In high-technology industries like electronics and telecommunications, economies of scope can be more of a driving force than traditional economies of scale.[1]

At the same time, there is a rapid acceleration in the rhythm of creation and dissemination of knowledge, which means that the life span of technologies and products gets progressively shorter and that obsolescence comes more quickly. In chemistry, for instance, there were 360,000 known substances in 1978.

This number had doubled by 1988. By 1998, there were three times as many known substances (1,700,000). Almost 150,000 new "patent equivalents" are added to the Chemical Abstracts data base every year, compared to less than 10,000 a year in the late 1960s.

In addition to stimulating economic growth through increased productivity resulting from innovation, knowledge contributes to poverty reduction and facilitates the achievement of most of the Millennium Development Goals.

> *"Science, technology and innovation underpin every [Millennium Development] goal. It is impossible to think of making gains in concerns to health and environment without a focused Science, Technology and Innovation (STI) policy, yet it is equally true that a well-articulated STI policy can make huge gains in education, gender equality or upgrading of living conditions."*
> *(UN Science, Technology and Innovation MDG Task Force Interim Report, December 2003)*

Drastic progress in agricultural output, for example, comes from the application of the Green Revolution. Similarly, remarkable advances in the resolution of health issues are owed to the application of scientific knowledge and the work of highly qualified health personnel. Simple GPS handheld devices can now be used easily to find water in drought stricken areas. All countries also need the scientific capacity to understand critical issues such as global warming, the pros and cons of using genetically modified crops, or the ethical dimensions of cloning. Finally, progress in seismology, vulcanology and climatology has enhanced the ability to anticipate and prepare for natural

disasters like floods, tsunamis and droughts. The existence of a tsunami warning system around the Indian Ocean, similar to the one already in place around the Pacific Rim, would undoubtedly have saved thousands of lives on December 26, 2004.

A direct product of the application of science and technology is the information and communication revolution. The advent of printing in the 15th century brought about the first radical transformation in the way knowledge is kept and shared by people. Today, technological innovations are revolutionizing again the capacity to store, transmit, access and use information. Rapid progress in electronics, telecommunications and satellite technologies, permitting high capacity data transmission at very low cost, has resulted in the quasi abolition of physical distance. For all practical purposes, there are no more logistical barriers to information access and communication among people, institutions and countries

Changing education and training needs

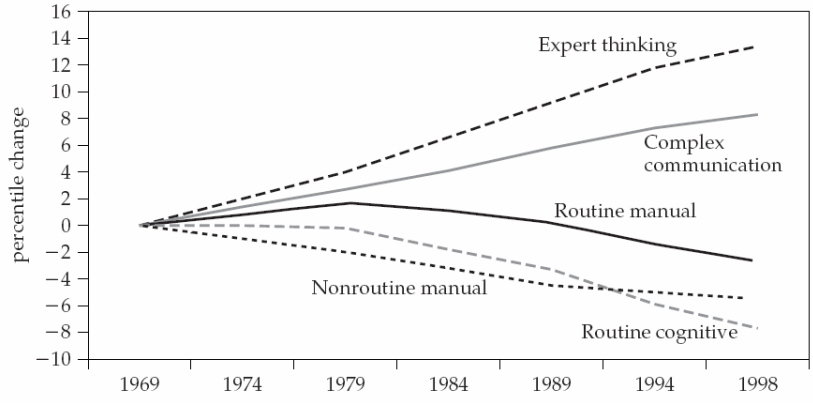
A trend towards higher and different skills has been observed in OECD countries and in the most advanced developing economies, as a result of increased competition in the labor market and rapid change in economic structures. This is confirmed by recent analyses of rates of return in a few Latin American countries (Argentina, Brazil and Mexico) which show a rising rate of return for tertiary education, a reversal of earlier trends in the 1970s and the 1980s.[2] Moreover, in OECD countries, highly skilled white collar employees account for 25 to 35 per cent of the labor force.

A second, related dimension of change is the *need to train young people to be flexible and to acquire the capacity to adapt easily to a rapidly changing world.* Recent research carried out by Levy and Murnane on the skills requirements for the tasks performed in the US labor market shows the types of skills for which there is less demand or which have been taken over by computers and those for which there has been increased demand.[3] In their path-breaking study, the authors divided the tasks performed in firms into five broad categories:

- *Expert thinking:* solving problems for which there are no rule-based solutions, such as diagnosing the illness of a patient whose symptoms are out of the ordinary;
- *Complex communication:* interacting with others to acquire information, to explain it, or to persuade others of its implications for action; for example, a manager motivating the people whose work he/ she supervises;
- *Routine cognitive tasks:* mental tasks that are well described by logical rules, such as maintaining expense reports;
- *Routine manual tasks:* physical tasks that can be well described using rules, such as installing windshields on new vehicles in automobile assembly plants; and
- *Non-routine manual tasks:* physical tasks that cannot be well described as following a set of "if-then-do" rules and that are difficult to computerize because they require optical recognition and fine muscle control; for example, driving a truck.

The figure below shows trends for each type of task. Tasks requiring expert thinking and complex communication grew steadily and consistently during the 1970s, 1980s, and 1990s. The share of the labor force employed in occupations that emphasize routine cognitive or routine manual tasks remained stable in the 1970s and then declined over the next two decades. Finally, the share of the labor force working in occupations that emphasize non-routine manual tasks declined throughout the period.

Economy-wide measures of routine and non routine task inputs
United States, 1969–98



Source: Reproduced from Levy and Murnane (2004), p. 50, figure 3.5.

Note: Each trend reflects changes in the numbers of people employed in occupations emphasizing that task. To facilitate comparison, the importance of each task in the US economy is set to zero in 1969, the baseline year. The value in each subsequent year represents the percentile change in the importance of each type of task in the economy.

OECD's Program for International Student Assessment (PISA), which measures how well 15-year-olds in school are prepared to meet the challenges of today's knowledge societies, is the only available international survey that comes close to assessing the effectiveness of education systems in preparing young people for the expert thinking and complex communication skills studied by Levy and Murnane.

PISA looks at students' ability to use their knowledge and skills to meet real-life challenges, rather than to master facts or a specific school curriculum. The first round of PISA was in 2000. It covered several content areas, but focused more on reading literacy, covering more than 300,000 secondary-school students in over thirty countries (including a few non-OECD members). The second round, in 2003, focused more on mathematics, and included measures of problem-solving ability. The 2003 PISA results clearly show that a large proportion of the target population does not meet the expected standards. In OECD countries, an average of 25 per cent of the tested population have low levels of achievement (inferior to level 2 on a scale from 1 to 5). The results are much worse in developing countries. In Mexico, for example, 67 per cent of the students attain less than the minimal level; in Tunisia 75 per cent are in the same situation.[4]

The third dimension of change in education and training needs is *the growing*

importance of continuing education needed to update knowledge and skills on a regular basis because of the short "shelf life" of knowledge. The traditional approach of studying for a discrete and finite period of time to acquire a first degree or to complete graduate education before moving on to professional life is being progressively replaced by practices of lifelong education. Training is becoming an integral part of one's working life, and takes place in a myriad of contexts: on the job, in specialized higher education institutions, or even at home. As Shakespeare wrote with prescience several centuries ago:

"Learning is but an adjunct to ourself,
And where we are our learning likewise is."

In the medium term, this may lead to a progressive blurring between initial and continuing degree studies, as well as between young adult and mid-career training. Finland, one of the leading promoters of continuing education in Europe, is among the most advanced nations in terms of conceptualizing and organizing tertiary education along these new lines. Today, the country has more adults engaged in continuing education programs (200,000) than young people enrolled in regular higher education degree courses (150,000). But not all countries have achieved a balanced educational development as reflected in the qualifications of their labor force. While in Finland the proportion of the population older than 15 with secondary or tertiary education levels has increased from 12 to 70 per cent from 1960 to 2000, in a developing country such as Senegal it has grown only from 4.5 to 10 per cent over the same period.

From the student s perspective, the desire to position oneself for the new types of jobs in the knowledge economy provides a strong incentive to mix study program options and qualifications, often beyond traditional institutional boundaries. New patterns of demand are emerging, whereby learners attend several institutions or programs in parallel or sequentially, thus defining their own skill profiles in the labor market.

Another important consequence of the acceleration of scientific and technological progress is the diminished emphasis in tertiary education programs on the learning of facts and basic data per se. There is a growing importance of what could be called methodological knowledge and skills, i.e. the ability to learn in an autonomous manner. Today in many disciplines, factual knowledge taught in the first year of study may become obsolete before graduation. The learning process now needs to be increasingly based

on the capacity to find, access and apply knowledge to problem-solving. In this new paradigm, where learning to learn, learning to transform information into new knowledge, and learning to transfer new knowledge into applications is more important than memorizing specific information, primacy is given to information seeking, analysis, the ability to reason, and problem-solving. In addition, competencies such as learning to work in teams, peer teaching, creativity, resourcefulness and the ability to adjust to change are also among the new skills which employers value in the knowledge economy.

The changing tertiary education landscape

New Forms of Competition. The decreased importance of physical distance means that the best universities in any country can decide to open a branch anywhere in the world or to reach out across borders using the Internet or satellite communication links, effectively competing with any national university on its own territory. With 90,000 and 500,000 students respectively, the [public] University of Maryland University College and [private] University of Phoenix have been the fastest growing distance education institutions in the USA in the past five years. The British Open University has inundated Canadian students with Internet messages saying more or less "we'll give you degrees and we don't really care if they're recognized in Canada because they're recognized by Cambridge and Oxford. And we'll do it at one-tenth the cost." [5] It is estimated that, in the US alone, there are already more than 3,000 specialized institutions dedicated to online training. Thirty-three states in the US have a statewide virtual university; and 85 per cent of the community colleges are expected to offer distance education courses by 2002.[6] Distance education is sometimes delivered by a specialized institution set up by an alliance of universities, as is the case with Western Governor University in the US and the Open Learning Agency in British Columbia.

The proportion of US universities with distance education courses has grown from 34 per cent in 1997-98 to about 50 per cent in academic year 1999-2000, with public universities being much more advanced than private ones in this regard.[7] The Mexican Virtual University of Monterrey offers 15 master's programs using teleconferencing and the Internet that reach 50,000 students in 1,450 learning centers throughout Mexico and 116 spread all over Latin America. In Thailand and Turkey, the national open universities enroll respectively 41 and 38 per cent of the total student population in each country.

Corporate universities are another form of competition which traditional universities will increasingly have to reckon with, especially in the area of continuing education. It is estimated that there are about 1,600 institutions in the world functioning today as corporate universities, up from 400 ten years ago. Two significant examples of successful corporate universities are those of Motorola and IBM. Recognized as one of the most successful corporate universities in benchmarking exercises, Motorola University, which operates with a yearly budget of 120 million dollars representing almost four per cent of its annual payroll, manages 99 learning and training sites in 21 countries.[8] IBM's corporate university, one of the largest in the world, is a virtual institution employing 3,400 professionals in 55 countries and offering more than 10,000 courses through Intranet and satellite links.

Corporate universities operate under one of any combination of the following three modalities: (i) with their own network of physical campuses (e.g., Disney, Toyota and Motorola), (ii) as a virtual university (e.g., IBM and Dow Chemical), or (iii) through an alliance with existing higher education institutions (e.g., Bell Atlantic, United HealthCare and United Technologies). A few corporate universities, such as the Rand Graduate School of Policy Studies and the Arthur D. Little School of Management, have been officially accredited and enjoy the authority to grant formal degrees. Experts are predicting that, by the year 2010, there will be more corporate universities than traditional campus-based universities in the world, and an increasing proportion of them will be serving smaller companies rather than corporate giants.

Franchise universities constitute a third category of new competitors. In many parts of the world, but predominantly in South and Southeast Asia and the formerly socialist countries of Eastern Europe, there has been a proliferation of overseas "validated courses" offered by franchise institutions operating on behalf of British, U.S., and Australian universities. One-fifth of the 80,000 foreign students enrolled in Australian universities are studying at offshore campuses, mainly in Malaysia and Singapore (Bennell 1998). The cost of attending these franchise institutions is usually one-fourth to one-third what it would cost to enroll in the mother institution.

The fourth form of unconventional competition comes from the new "academic brokers", virtual entrepreneurs who specialize in bringing together suppliers and consumers of educational services. A few examples can be mentioned to illustrate this new trend:

- Companies like Connect Education, Inc. and Electronic University Network

build, lease and manage campuses, produce multimedia educational software, and provide guidance to serve the training needs of corporate clients world-wide.[9]

- Rennselaer Polytechnic Institute coordinates and delivers degree programs from Boston University, Carnegie Mellon, Stanford University and Massachusetts Institute of Technology (MIT) for the employees of United HealthCare and United Technologies.[10]
- Nexus, a UK based company advertising itself as the "world's largest international student recruitment media company", organizes fairs in many East Asian and Latin American countries, bringing together higher education institutions and students interested in overseas studies.
- Web sites like HungryMinds.com and CollegeLearning.com act as clearinghouses between schools and prospective students.
- ECollegebid, a consortium of colleges and universities, matches student objectives and ability to pay for an education with the willingness of a tertiary institution to offer tuition discounts.

At the shadier extreme of the academic brokering industry, one finds Internet-based essay mills offering to help students with their college assignments. Defended by their promoters as useful and harmless research tools, they are under attack from the academic community who decries their capacity to increase plagiarism and cheating.

Some "traditional" higher education institutions have been quick to catch onto the potential of education and training brokering arrangements. St. Petersburg Junior College recently entered into a partnership with Florida State University, the University of Central Florida and the UK Open University to offer four-year degree programs at some of its sites.[11] The University of California at Santa Cruz, having set up its own corporate training department ten years ago right in the middle of Silicon Valley, has established successful partnerships with a number of corporate universities, notably those operated by GE and Sun Microsystems, even managing to attract additional state funding on a matching grant basis.[12]

Changes in Structures and Modes of Operation. Faced with new training needs and new competitive challenges, many universities have undertaken important transformations in governance, organizational structure and modes of operation.

A key aspect has to do with the ability of universities to organize traditional

disciplines differently, taking into consideration the emergence of new scientific and technological fields. Among the most significant ones, it is worth mentioning nanotechnology, molecular biology and biotechnology, advanced materials science, microelectronics, information systems, robotics, intelligent systems and neuroscience, and environmental science and technology. Training and research for these fields require the integration of a number of disciplines which have not necessarily been in close contact previously, resulting in the multiplication of inter- and multidisciplinary programs cutting across traditional institutional barriers. For example, the study of molecular devices and sensors, within the wider framework of molecular biology and biotechnology, brings together specialists in electronics, materials science, chemistry and biology to achieve greater synergy. Imaging technology and medical science have become closely articulated. Universities all over the world are restructuring their programs to adapt to these changes.

The new patterns of knowledge creation do not imply only a reconfiguration of departments into a different institutional map but more importantly, imply the reorganization of research and training around the search for solutions to complex problems, rather than the analytical practices of traditional academic disciplines. This evolution is leading to the emergence of what experts call "transdisciplinarity", with distinct theoretical structures and research methods.[13] McMaster University in Ontario, Canada, and the University of Maastricht in Holland were among the first universities to introduce problem-based learning in their medical and engineering programs in the 1970s. The University of British Columbia is promoting "research-based learning", an approach linking undergraduate students to research teams with extensive reliance on information technology for basic course information. Waterloo University in Western Ontario earned a high reputation for its engineering degrees – considered among the best in the country – through the successful development of cooperative programs that integrate in-school and on-the-job training.

Even PhD. programs may be affected by this trend towards increased multi-disciplinarity. Proponents of a reform of doctoral education in the US predict that PhD. students will be less involved in the production of new knowledge and more on contributing to the circulation of knowledge across traditional disciplinary boundaries.

Realigning universities on the basis of inter- and multi-disciplinary learning and research themes does not imply only changes in program and curriculum design, but also significant modifications in the planning and organization of

the laboratory and workshop infrastructure. From the Georgia Institute of Technology comes a successful experience in developing an interdisciplinary mechatronics laboratory serving the needs of students in electrical, mechanical, industrial, computer and other engineering departments in a cost-effective manner.[14] A unique partnership bringing together Penn State University, the University of Puerto Rico-Mayaguez, the University of Washington and Sandia National Laboratories has permitted the establishment of "Learning Factory" facilities across the partner schools which allow teams of students from industrial, mechanical, electrical, chemical engineering and business administration to work on interdisciplinary projects.[15]

The evolution towards lifelong learning means that young high school graduates will gradually cease to be the primary clientele of universities. As a result, universities must organize themselves to accommodate the learning and training needs of a very diverse clientele: working students, mature students, stay-at-home students, travelling students, part-time students, day students, night students, weekend students, etc. One can expect a significant change in the demographic shape of higher education institutions, whereby the traditional structure of a pyramid with a majority of first degree students, a smaller group of post-graduate students, and finally an even smaller share of participants in continuing education programs will be replaced by an inverted pyramid with a minority of first time students, more students pursuing a second or third degree, and the majority of students enrolled in short-term continuing education activities. Already in the US, almost half of the student population consists of mature and part-time students, a dramatic shift from the previous generation. In Russia, part-time students represent 37 per cent of total enrolment.

Tertiary education institutions are also changing their pattern of admission to respond in a more flexible way to growing student demand. In 1999, for the first time in the US, a number of colleges decided to stagger the arrival of new students throughout the academic year, instead of restricting them to the fall semester.

In China, similarly, a spring college entrance examination was held for the first time in January 2000, marking a sea change in the history of that country s entrance examination system. Students who fail the traditional July examination will no longer have to wait a full year anymore to get a second chance.

Conclusion: New opportunities and challenges

The major trends and changes outlined in this article represent both opportunities and challenges for tertiary education institutions in developing countries, which are called upon to play a vital capacity building role in support of economic growth, poverty reduction, and achievement of the Millennium Development Goals.

On the positive side, the use of modern technology can revolutionize the way education is delivered, resulting in more and better learning opportunities. The concurrent use of multimedia and computers permits the development of blended pedagogical approaches involving active and interactive learning. Frontal teaching can be replaced by or associated with asynchronous teaching in the form of online classes that can be either scheduled or self-paced. With a proper integration of technology in the curriculum, teachers can move away from their traditional role as one-way instructors towards becoming facilitators of learning.

In a pioneer study conducted at the beginning of the 1990s, two professors at the University of Michigan, Kozma and Johnson, analyzed several ways in which information technology could play a catalytic role in enriching the teaching and learning experience. They suggested a new pedagogical model involving (i) active engagement of the students rather than passive reception of information, (ii) opportunities to apply new knowledge to real-life situations, (iii) the ability to represent concepts and knowledge in multiple ways rather than just with text, (iv) the use of computers to achieve mastery of skills rather than superficial acquaintance, (v) learning as a collaborative activity rather than an individual act, and (vi) an emphasis on learning processes rather than memorization of information.[16]

Web-based virtual labs, remote lab experiences and access to digital libraries are but a few examples of the new learning enhancing opportunities that increased connectivity can provide cash-strapped universities and colleges in developing countries. For instance, tertiary institutions with virtual libraries can join the recently established Online College Library Center which offers inter-library loans of digitized documents on the Internet. Even in traditional libraries, CD-ROMs can replace journal collections. Cornell University, for example, has created the Essential Electronic Agricultural Library , which consists of a collection of 173 CD-ROMs storing text from 140 journals for the past four years that can be shared with libraries at universities in developing country.

The open education movement, pioneered by universities such as MIT (Open CourseWare), Carnegie Mellon (Open Learning Initiative), Rice University (community-based learning object commons), and Harvard University (special library collections) with funding from the Hewlett Foundation, offers the promise of extensive content and software resources that tertiary education institutions in developing countries could use and adapt to fit their needs. A Chinese consortium working in partnership with MIT has already established an expanded Chinese version of the Open CourseWare website. Users all over the world are leveraging the power of the Internet to form virtual communities of learning to help each other apply and further enrich available open education resources.

But the encouraging developments discussed in this paper have also brought about significant challenges. First of all, reliance on Information and Communication Technologies (ICT) is not a panacea. To create a more active and interactive learning environment, faculty must have a clear vision as to the purpose of the new technologies and the most effective way of integrating them in program design and delivery what experts call instructional integration. Then they must educate themselves in the use of the new pedagogical channels and supports. A 2000 report from the University of Illinois on the use of Internet classes in undergraduate education offers a few cautionary warnings.[17] Quality online education is best achieved with relatively small class sizes, not to exceed 30 students.

Moreover, it does not seem desirable to teach an entire undergraduate degree program only with online classes if students are expected to learn to think critically and interact socially in preparation for professional life. Combining online and regular classroom courses gives students more opportunity for human interaction and development of the social aspects of learning through direct communication, debate, discussion and consensus building.

These pedagogical requirements apply also to the design and delivery of distance education programs which need to match learning objectives with appropriate technology support. In scientific fields like engineering, for example, the need for practical training is often overlooked. Computer simulations alone cannot replace all forms of applied training. In many science and technology-oriented programs, hands-on activities in laboratories and workshops remain an indispensable constituent of effective learning.

Second, poor connectivity is a serious constraint in many developing countries, which severely restricts the likelihood that tertiary education institutions could take full advantage of ICT-related opportunities. Many low-

income nations have limited resources for building up their ICT infrastructure and lack the economic and political leverage to negotiate favourable access and price conditions with international telecommunications firms. A recent evaluation of connectivity in African universities found that the 87 institutions that participated in the survey have, on average, no more broadband capacity than an average household in the US, at a cost 100 times higher.[18]

Third, developing countries face a whole range of quality assurance issues as a result of the new developments analyzed in this article. It is doubtful that the principles, norms and criteria routinely applied to evaluate or accredit campus-based programs can be used without significant adjustments to assess the quality and effectiveness of virtual universities, online courses and other modalities of distance education.

Appropriate evaluation processes are needed to reassure the public that the courses, programs and degrees offered by the new types of distance education institutions and the new forms of e-learning and blended programs in traditional universities meet acceptable academic and professional standards. Less emphasis is likely to be given to traditional input dimensions such as qualifications of individual faculty and student selection criteria, and more on the capabilities of graduates. Western Governors University's initiative to move to competency-based evaluations performed by an independent agency has created an interesting precedent which may ultimately induce change in evaluation methods used by traditional universities.

In the final analysis, flexibility may be the one single characteristic most likely to determine tertiary education institutions ability to contribute effectively to the capacity building needs of developing countries. Increasingly, tertiary education institutions need the capacity to react swiftly by establishing new programs, reconfiguring existing ones, and eliminating outdated courses without being hampered by bureaucratic regulations and obstacles.

This must take place in the context of systematic efforts to develop and implement a vision through strategic planning. By identifying both favourable and harmful trends in their immediate environment and linking them to a rigorous assessment of their internal strengths and weaknesses, institutions can better define their mission, market niche and medium-term development objectives and formulate concrete plans to achieve these objectives. For lack of strategic planning, many new distance education institutions, for example, have adopted inappropriate technologies, failing to assess their adequacy against the purpose of their programs, the competency of their professors and the learning needs of their students.

Finally, it is important to stress that strategic planning is not a one-time exercise; the more successful organizations in both business and academia are those that are relentless in challenging themselves in the pursuit of better and more effective ways of responding to client needs. The advice that the Roman philosopher Seneca gave us two thousand years ago may be even more relevant today as it was during his time:

"There is no favorable wind for those who do not know where they are going."

Notes

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Opportunities and Responsibilities of High Tech Industries

by Lene Lange, Professor, Science Director,
Molecular Biotechnology, Novozymes A/S

Abstract

From High Tech Industry point of view the knowledge and capacity relations to developing countries has a strong focus on the "growth economies" such as those of India, China, Brazil, Singapore, and South Korea. There are very encouraging perspectives and hopes for achieving win/win relations between High Tech industry and these countries, far beyond the risk for "brain drain", as exemplified by the area of industrial biotechnology. However, the relations of the High Tech Industry to the poorer and slower growing developing countries are almost non-existing: they neither present interesting purchasing value markets nor suitable sites for placing daughter companies or other activities. At most, a few scientists from these countries may be able to obtain positions in the High Tech industry. A focused and determined effort is needed in order to get these countries into the loop and prevent an increasing marginalization in a globalized world. For this, market economy and market forces are not sufficient. Enhanced and stimulated South/South alliances, making the growth countries serve as engines for development in the poorer countries is an obvious opportunity. But is it enough? Is there a realistic role for the private sector in the development of the poorest countries as well?

High-technology industries & developing countries

The focus of the industry is on the "growth economies" among the developing countries, e.g. China, India, and Brazil, which are attractive for high tech industry, due to:

- Rapidly growing markets
- Well educated people, and
- Good infra-structure.

Similarly, attracting high tech industrial investment is a high priority for these countries in order to stimulate economic growth.

High tech investment in such "Growth/Developing" countries is potentially a win/win situation, in which the host country, among other, gains:

- Foreign investments, creating skilled jobs
- Training of capable people and providing job experience in high tech industrial environment
- Creation of a learning loop for environmental authorities and regulatory legislation and management, and
- Direct access to high value products.

The possible down-sides for the industry are:

- Need for heavy and risky investment
- Inherent risk of making technology transfer to future competitors.

while the possible down-sides for the host country are:

- Loosing market shares to foreign industries, and
- Loosing competent people.

Example of a win/win situation: Novozymes in China

Host country gain:

- Technology transfer regarding state of the art biological production
  - microbial fermentation
  - recovery and formulation
  - compliance with environmental requirements

- Skilled industrial jobs in a Tripple Bottom Line industry, providing input to cleaner industries!

- Chinese staff gets exposure to Western countries high tech environments (incl management).

Novozymes' most important benefits:

- Access to a large and rapidly growing market, and
- First hand knowledge about values, priorities and capabilities of the worlds largest country.

Examples of additional public benefits:

- The Local Novozymes President serves as Vice Chairman for the Business Council for Sustainable Development in China
- The leading scientist in the Novozymes R&D laboratory is part of leadership of the Mycological Society of China
- Novozymes sponsorship for biodiversity studies at Chinese universities (-> technology transfer).

Such activities of senior, local Novozymes staff are encouraged!

Developing countries in a globalized knowledge society

Developing countries may be divided according to their ability to take part in globalization, in:

1. the growth economy countries
2. the remaining countries, being left out of the knowledge loop. (To secure this market forces are not sufficient!)

Western high tech industry takes interest in and invests in connections to growth countries, but there is an urgent need to for the West to focus on the remaining countries. In this, knowledge and capacity building should be the prime focus of development aid programs.

High Tech industry relations to the poorest of the developing countries

These countries do not constitute interesting markets, nor do they present attractive opportunities for establishment of subsidiaries due to their lack of: infrastructure, skilled staff and home market drive. It is often unlikely that their young scientists can compete for positions in high tech companies, in spite of the fact that the high tech industry has a lot the countries could use jobs, technologies, products, drive.

In contrast, the poorer among the developing countries risk to loose some of their best brains to the industrial countries. However, it is not only a loss; it may provide stimulus and role models, many of the best may return, while others will send substantial amounts of money back. And, those returning with high skills provide important technology transfer!

An example of poor country strategies, illustrated by the use of clean technology as a development driver

By making enzymes available for improvement of classical industries (textile, leather, paper mills) and training staff to handle the relevant biological processes, it may become possible to make lateral use of the new biotech knowledge to start other types of agro-industry businesses, leading to rural development and job creation. This may help start a positive environment loop, e.g. by pricing water and waste water and building infrastructure.

Development aid

The poorest developing countries usually receive development aid, but building positive donor relations takes a lot of time and effort. This should be kept in mind and the time, focus, and attention of the developing country elite should be respected. Optimized Tripple Bottom Line thinking is needed also for aid programs!

Take Home Messages 1

- Development aid should make (high level) capacity building and technology transfer a prime focus
- Development aid programs should not waste the time and attention of the developing country elite on the donor agendas
- South/South relations and (private sector) technology may be used as potent drivers of development

Take Home Messages 2

- The worst risk for developing countries is to be marginalized, both with respect to investments and access to high level jobs
- The presence of tech industry in a country may lead to an important win/win situation
- Loosing skilled people to Western countries is a loss but also holds a potential for stimulus (note that, eventually, Western countries may also loose skilled jobs to the growth countries)

Take Home Messages 3

- High technology may be a development driver
- This is not only possible in the form of the start-up of pharma enterprises
- Cleaner technologies, biological solutions and other knowledge intensive areas can be efficient development drivers

- The most development-relevant area is the transfer of cleaner and more efficient agro-industrial technologies, upgrading existing production plants, see for example: Capacity building in Thailand through Novozymes/ BIOTEC collaboration on bioprospecting (under mutually agreed terms, in full compliance with the Biodiversity Convention)

Consequences of Current Trends in S&T Higher Education

by Michael Oborne, Director, International Futures Program, Global Science Forum, OECD

Abstract

The development of human resources in science and technology is an acknowledged priority for countries that seek to advance science and technology as major driving forces of the increasingly globalised economy. Demand for a highly trained workforce in S&T is expected to rise in future years in a majority of developed and developing economies. However, concordant observations suggest an apparent decline in interest in science and engineering studies in a number of OECD countries. This apparent decrease in student enrolment at various level of the educational system varies from country to country in the OECD area. The actual reasons of such disinterest have not been assessed precisely, but some countries are concerned about the impact on competitiveness and productivity. What consequences such decline may have on students' flows from developing countries to more developed economies remains to be determined.

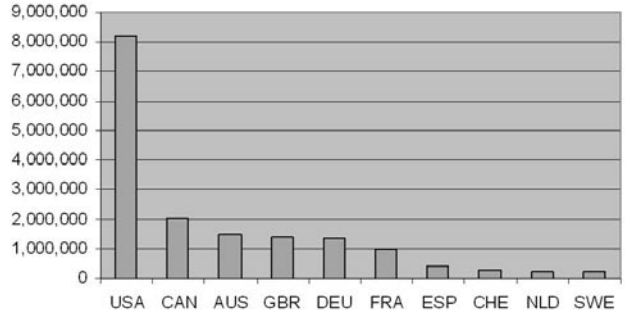
Consequences of current trends in S&T higher education

The development of human resources in science and technology is an acknowledged priority for societies which seek to advance science and technology as major driving forces of the increasingly globalised economy. Traditionally, OECD area countries have been leaders in providing human capital for the science and technology revolution, a trend that was built up over centuries of awareness and investment in institutions and ideas. Today, a new situation prevails, as large developing economies enter the scene with huge untapped human resources and a commitment to build a national, highly

competitive innovation economy. This short paper gives an account of recent trends and developments in higher education throughout the OECD area, and makes some remarks about the rising importance of economies such as China and India.

The sharp increase in demand for skilled workers in the OECD countries in the period 1985-2005 was fuelled by the digital revolution, and in particular the informatics innovations of the late 1980's. Both software and hardware engineering skills became highly prized skills, and enrolments in the major universities, particularly in the Anglo-Saxon countries, shifted dramatically to science, engineering and computer skills throughout this period. The United States, which led much of the informatics revolution, began to attract higher numbers of foreign students during this period, and became the global training place for many of the developing countries. The situation was not especially new, but it was particularly striking because of the high pay-off in well remunerate employment was touted as an example of markets adjusting to new needs with high pay. While the supply of science and technology human capital was effectively global, the demand for such skills was concentrated in the Untied States itself, making the US the premier country for attracting – and retaining – global talent pools.

Stock of highly skilled* immigrants in OECD countries

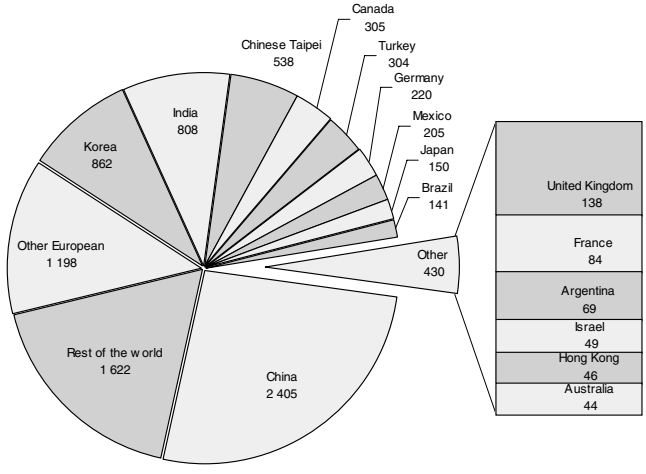


* Age 15+, ISCED 5/6

Source: Dumont and Lemaitre, 2004

The United States had begun to accept students from virtually every country in the world, and was awarding the largest number of degrees to foreign students in the OECD area by 2001.

Number of S&E doctorates awarded to foreign citizents in the US
By citizenship or origin, 2001

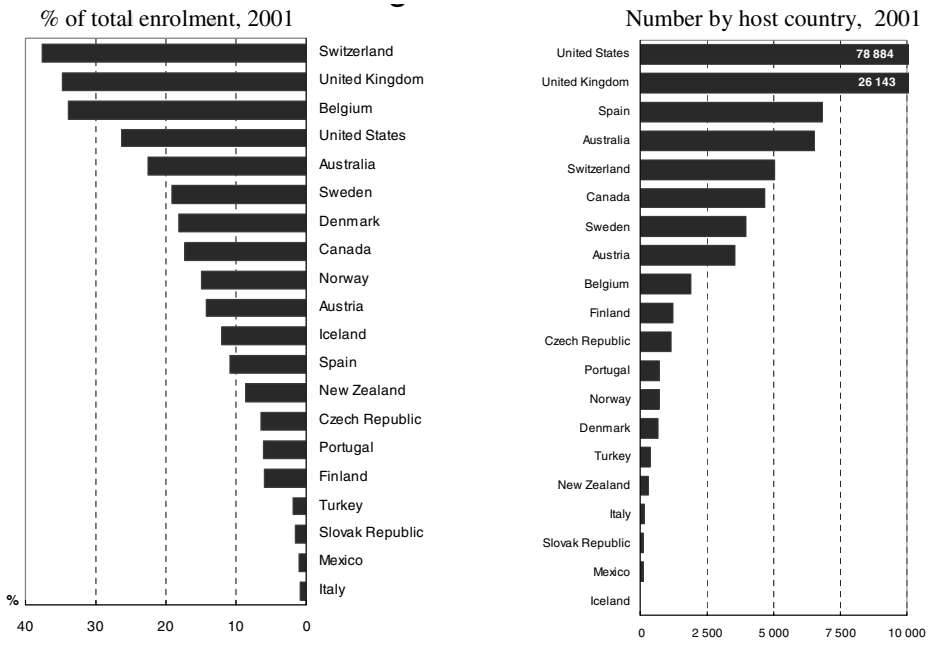


Throughout the OECD area, there was a clear preference for foreign PhD students to move to English speaking countries, where the US, the UK, Australia, Canada combined had over three fourths of the foreign student population registered in 2001. To some extent, this preference was a reflection of the high priority these countries had afforded to scientific and research investments over the period 1946-2000, including a number of investments related to military and strategic objectives. The development of public-private partnerships in the 1980's, the change in status of many polytechnical institutions (which became universities) and the highly developed system of private foundation and individual support for research endowed many institutions in these countries with an advantage when developing new technology related programs. The fabled relationships between universities such as Stanford and MIT with the tech nology communities that surrounded them was yet again proof of an evolution of research in the direction of a less academic, and more applied outcome.

The following chart makes this clear. The vast majority of foreign students in the OECD area are enrolled in institutions located in English speaking countries, which then again reinforces the demand for more English language training, both in these countries, and increasingly in other countries as well where English is not the mother tongue. A number of OECD countries have instituted English language instruction in the tertiary institutions to attract

ever grown numbers of foreign students who are committed to learning one, but not two, foreign languages well enough to earn degrees. This is particularly true in the sciences and engineering.

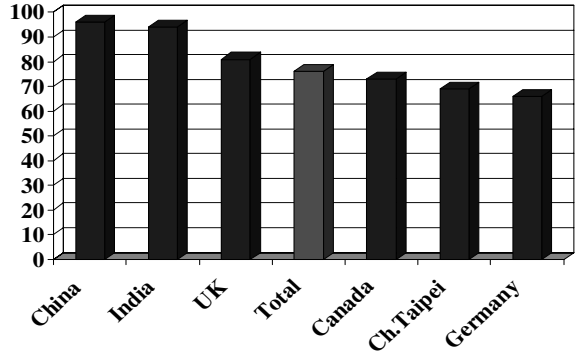
Foreign PhD students



Many of the students who were surveyed in the United States planned to stay in that country after they had graduated – with Germany and Canada included in this number. Increasingly, students were leaving OECD area countries, particularly in science, engineering and technology studies to attend graduate school in the US and UK, many with the hopes of staying some time after their studies in the host country.

This influx of students provided increasingly important inputs to the economies of the host countries, who quickly adopted new immigration and resident rules to both attract and to keep highly qualified talent within their borders. Examples of this are the H2 visa system in the United States, which were designed to attract highly talent from developing countries as well as from the OECD area.

Per cent of 1998-01 Foreign S&SE US degree recipients with "plans to stay" in the US



Source: NSF, S&E indicators, 2004

An excellent example of this "retention" factor in the high technology field is a study that was carried out on skilled human capital involved in start-ups in Silicon Valley over a twenty year period. Chinese capital represented 20 per cent of human capital by 1998, with Indian human capital at just over 10 per cent. Not only was the educational background a key to this phenomenon, but the framework conditions for start-up initiatives in the US were highly favourable to new entrants, especially those who had English language skills and local networks through educational background and training.

Changing conditions

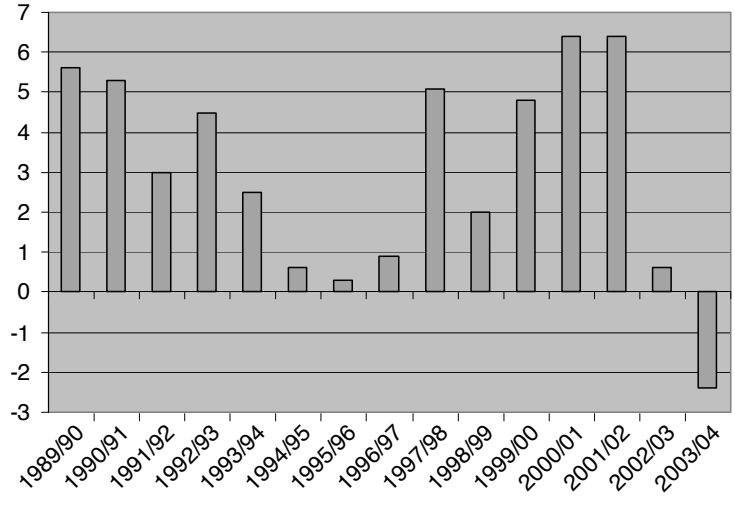
However, concordant observations suggest an apparent decline in interest in science and engineering studies in a number of OECD countries. This apparent decrease in student enrolment at various level of the educational system varies from country to country in the OECD area, but is a general trend throughout the OECD area. Many studies have been initiated to determine the cause of this decline in interest. Factors that have been identified are not surprising:

- difficulty and length of studies in science and engineering;
- career development
- relatively low salary
- need to focus and choose concentration area early in educational career (16-18 years old);
- perceived low employment opportunities

The actual reasons of such disinterest have not been assessed precisely, but many countries in the OECD area are concerned about the impact on national competitiveness and productivity. Many new programs, both national and regional (i.e. EU level) have been created to address what is perceived to be a serious problem.

But the situation has also changed for the United States, the UK and to a lesser extent Canada and Australia. The first, and most important change, was the government reaction to the terrorist attacks in September, 2001. Within months, the Homeland Security Department had been created in the government, and measures were introduced to both track foreign nationals on US soil, and to limit access of foreign nationals to "strategic assets" such as research laboratories and universities. Increasingly, these measures were strengthened, and border controls tightened. By 2003, US graduate deans were complaining that foreign student applications were down significantly, and that in some cases, university departments would have to review their ability to maintain graduate programs, as not enough US nationals were enrolled to staff the auxiliary teaching and laboratory functions.

Annual per cent change of international student enrolment in US higher-education institutions



Source: IIE (2004), "Open Doors Report", http://opendoors.iienetwork.org/

At the same time, The European Union was strengthening its programs to assist Member States in attracting and retaining foreign students, particularly in science and technology. Japan was following a similar course, although on a lesser scale due to the language requirements (some teaching in engineering is done in English in Japan).

The biggest factors for change were developments in China and India. Both had been major suppliers of foreign graduate students world-wide, and both were strengthening their educational systems to lure back graduates from abroad and establish world class institutions. Both governments were making significant efforts by the mid-2003 period to review and strengthen their graduate programs in science and to bring back trained human capital from abroad. Developments in the Bangalore region, as well as the Delhi and Mumbai region in India favoured this policy, as did the protracted high growth in the Chinese economy, part of which was due to the presence of foreign investors who were also fuelling demand for English language skilled human capital. Lastly, the behaviour of multi-national enterprises set the pace for moving human capital around the globe to meet changing needs of the private sector, and once again, in the image of the late 19th century, expatriate skilled capital is an integral and important part of the transfer of skills and knowledge throughout the world economy.

The situation in Europe

In 2000, the European Union set a policy agenda to develop a new type of economy. Ministers meeting in Lisbon adopted the ambitious Lisbon Agenda which was according to the statement issued by the assembly to make the EU a major player in the new knowledge-based economy:

"The Union has today set itself a new strategic goal for the next decade: to become the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion."

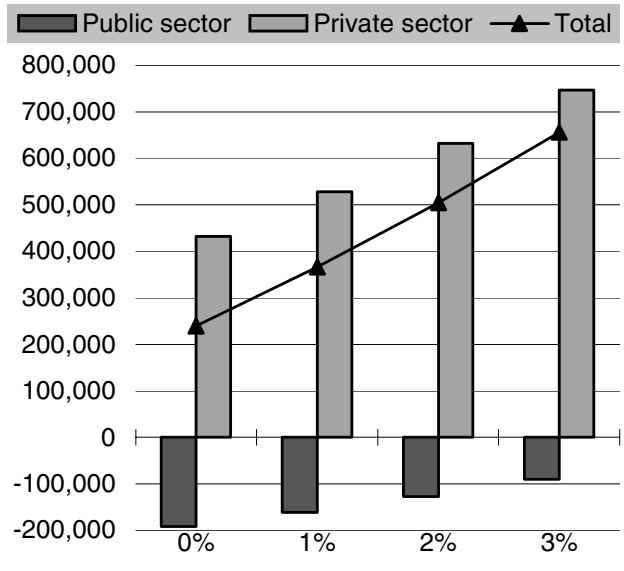
Ministers were, in fact, endorsing what had been happening in isolated areas around the EU, but now needed the combined attention and support of the member States in order to become a realty. Again, in 2002, at a meeting in Barcelona, ministers began to become more concrete about the ways in which the "KBE" (knowledge-based economy) would be built:

"overall spending on R&D and innovation …should be increased with the aim of approaching 3 per cent of GDP by 2010. Two-thirds of this new investment should come from the private sector."

The Lisbon agenda recognized the central importance of human capital – in fact, the KBE was largely a matter of producing, husbanding and encouraging human capital in an age when knowledge was increasingly the value-added that made the difference in innovative products and services that were springing up globally.

What does achieving this goal mean for the Member States of the European Union? In fact, it invites Member States to change – even radically chance in some cases – the development and use of skilled human capital over the next ten years. To meet the states goals of the Lisbon Agenda, more than 600,000 additional research personnel will be required in the EU.

Additional researchers required to meet EC Barcelona 3 per cent R&D target



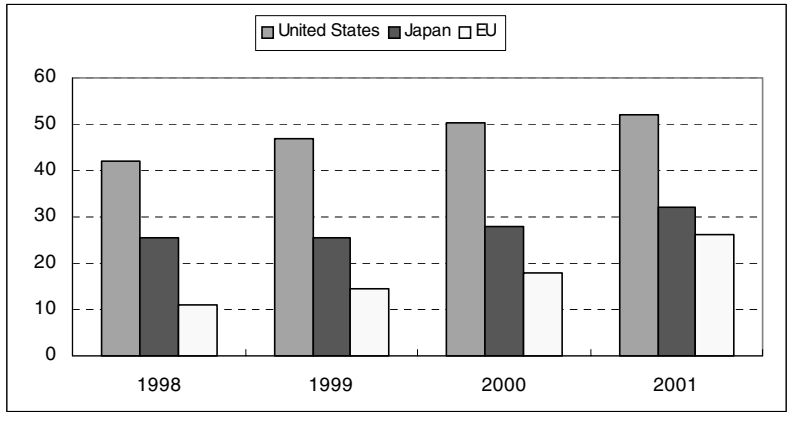
Clearly, this target is not going to be easy to attain – in fact, it cannot be attained in the timeframe prescribed by the Lisbon Agenda itself. Member States of the EU are not in a position to add this number of research personnel

to their budgets, particularly at a time when economic growth is sluggish in the region. Overall research budgets would need dramatic increases. At the same time, university facilities would need to be expanded to train and retain the large number of students passing through the system on their way to advanced degrees in science, engineering and technology. More importantly, it would mean a shift in enrollments in national universities, moving towards much larger numbers of students – either nationals of foreign students – pursing degrees in the sciences. Such shifts are difficult to make, and require both negotiations within faculties and significant injections of new investment from governments (most European universities are in the public sector). A priori, these seems unrealistic. You need growth to fuel this type of investment, and that growth is happening elsewhere in the world.

Where the KBE may be growing fast....

China, and to a lesser extent, India, have been growing by leaps and bounds in the past decade. Structural changes in domestic and international policies, changes in the governance and oversight of private business, new trade arrangements, opening to foreign direct investment and the like have made these two economies the star players in the global race for a growth engine. China alone has been growing by 9-10 per cent a year for the last eight years.

Number of Chinese students enrolled in tertiary education in the United States, Japan and the EU, thousands

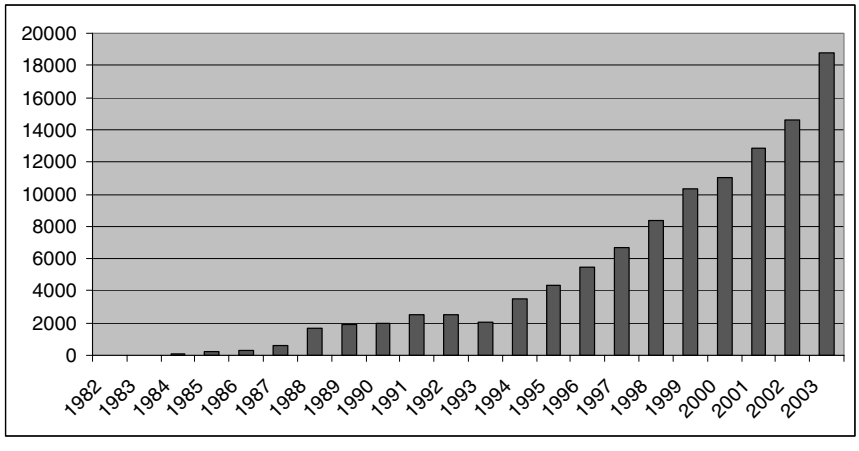


One of the key policies in the Chinese growth strategy is the training of qualified science and technology personnel abroad. China continues to increase the absolute numbers of students abroad, principally in the English speaking countries:

While not all of these students are in graduate school, nor in the sciences, there is a strong concentration of students in science and technology. The Chinese government has made special efforts to encourage science, and has concentrated efforts on investing in S&T facilities and universities.

At the same time, China is increasing the number of graduate doctoral degrees granted in the country itself, showing a commitment to the KBE:

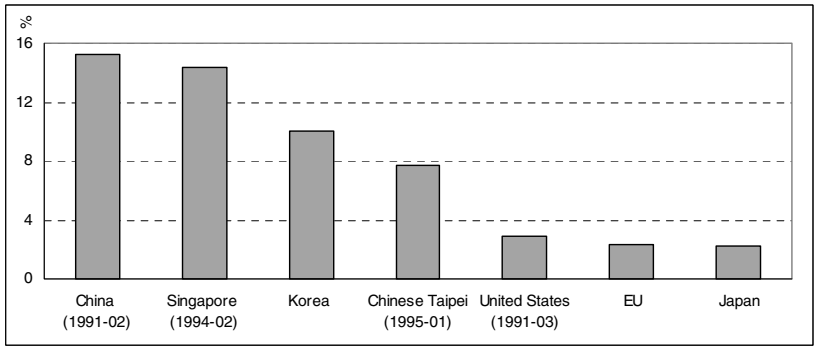
Doctoral degrees awarded in China



Source: Weiguo and Zhaohui, 2004

At the same time, the Chinese government is making significant investments in R&D. In the light of the Lisbon Agenda, it is interesting to see the relative performance of the Chinese economy and the engagements of the European Union. Although the absolute levels of investment are still in favor of the OECD countries, the Chinese authorities are committed to gaining on developed countries, and the levels commitment by the national and the regional authorities in China is growing very fast. China is now the third in gross domestic expenditure on reseach and development.

Growth of R&D expediture, annual average growth rate 1991-2001 (based on national currencies in constant prices)



Gross domestic expenditure in R&D (2002, $ Bill GDP PPPs)

US	277.1
Japan	106.8
China	**72.0**
Germany	53.9
France	36.6
UK	31.0
Korea	23.5

Source: OECD, MSTI, 2004/1

Conclusions

China is moving in the direction charted by many OECD countries. Among the national priorities are the long term investment in human capital, the necessary step towards ensuring a KBE. With the level of resources, the level of political commitment and the alacrity with which Chinese citizens will move to take advantage of these new policies, it is certain that China will move to centre stage economically if the politics of transition can be managed successfully. High unemployment, listless youth cultures, and lack-luster economic performance do not haunt these new economic giants, and they intend to take advantage of that historic opening.

Unless OECD countries take a closer look at their own long term developments, and adjust, however painfully, their research and development commitments, they are likely to be surpassed by developing countries such as China, India and perhaps even Brazil, where age-old entitlement policies are not so firmly in place, and innovation and change can come about through the new global culture of science.

The Role of International Organizations in Handling Brain Drain

by Julia Hasler, Programme Specialist for Life Sciences, UNESCO

Abstract

There are many different manifestations of "brain drain", and each country which suffers from this phenomenon may have a unique profile of causes and effects that are a result of the economic, political, social and cultural characteristics of that country. In affluent countries of Europe there is considerable concern about brain drain to the USA. In poorer countries, the drain is to any country or region that offers better opportunities for work and careers in science and technology. Another major factor in poor countries is "internal brain drain" where individuals trained in areas of science and technology are partially or fulltime employed elsewhere formally or informally, for what in Africa has been called PESA or personal economic survival activities. This same "internal brain drain" is seen in rich countries which are unable to convince their own brightest young people to study science and engineering subjects. Whilst the driving force may be primarily economic for many leaving their countries of origin, for others it has more to do with career aspirations. Brain drain, internal brain drain, brain gain, brain circulation, reverse brain drain are complex and dynamic global, regional and national processes and, therefore, changes are likely to emerge slowly and the idea that they can be controlled may be illusory. The solutions for different regions of the world are likely to be diverse, intersectoral, and probably driven by economic and political forces. The way that international organisations might play a new and positive role within these dynamics is by working with the reality of the mobility of workers in science and technology

and maximizing its benefits. A number of different means of ensuring an "equitable distribution of the benefits" of brain circulation will be explored at this meeting in the working group discussions. These may range from support to the African, Asian, and Latin American diaspora for meaningful research and development projects in their countries of origin, to perhaps new ways of viewing training in science and technology as a global "goods" with a tax for the "users" to be paid to the "producers".

The role of international organizations in handling brain drain

There are many different manifestations of "brain drain", and each country which suffers from this phenomenon may have a unique profile of causes and effects that are a result of its historical, economic, political, social and cultural characteristics. In affluent countries of Europe, there is considerable concern about loss of scientific and technical human resources to the USA (Mahroum, 1998). In poorer countries, the migration of trained people is to any country or region that offers better opportunities for work and careers in science and technology. Terms in use to describe aspects of the phenomenon include not only brain drain, but also brain gain, brain circulation, brain exchange, brain return, and brain waste. Much in-depth analysis and discussion of brain drain and its impact on economies and development can be found through a search of the Internet. This presentation serves as a short introduction to the subject and is not an exhaustive review.

There has been an evolving view of "brain drain" starting with the British Royal Society which first coined the expression in 1963 to describe the outflow of scientists and technologists to the United States and Canada in the 1950s and early 1960s (Royal Society, 1963). It was recognised that the welfare of those remaining in the countries of origin could be adversely affected by an outflow of educated manpower, viewed as "Human Capital". Consistent with this viewpoint, Bhagwati et al. proposed a "Brain Drain Tax" in the mid-1970s, as a monetary compensation to less-developed countries that should be paid by developed ones for the draining of their cultural and scientific elites through that outflow.

An interesting debate around Bhagwati's proposal may be found in the papers of Bhagwati & Dellafar (1973), Bhagwati (1975, 1976a, 1976b) and Hamada (1977). In the 1960s and 1970s, the numerous debates on brain drain

concluded that it was conditioned by political and economic imbalances in the world system. Several studies analysed the role of international institutions and organizations, the coordination of social and migration policies, the legitimacy of restrictive migration policies (in relation to the human rights declaration), etc. The notion of skilled migrants as "Human Capital" belonging to their country of origin to a sufficient degree to be the object of a tax, although it captures an important abstract element of the overall dilemma, was deeply repellent to all notions of individual freedom and human rights, and hence was unworkable as such.

Current views span a spectrum from seeing brain drain as the hunting of human intellectual property by rich nations to an issue of human rights with regard to freedom of mobility of skilled individuals. A number of poorer countries are justifiably very critical of the active recruiting of nurses, doctors and teachers from their countries to fill vacuums in human resources of rich nations. On the other hand, there is the view that brain drain is encouraged, not only because the technical and economic underdevelopment of poorer countries means that job opportunities are limited or non existent there, but also because of tendencies in some countries to fill such good jobs as there are on a basis of family connections, political influence, and corruption. In some countries, there is a reality gap between the political rhetoric offering incentives to people to return to their home countries and the actual opportunities available.

The concept of "brain gain" is usually used to describe the benefits accruing to countries where skilled workers migrate and it is clear that the economic benefits are considerable. Whilst the supplier countries clearly suffer brain drain, it may be possible that there is some gain from brain drain, not just for the beneficiary countries but also for the supplier country, where there are insufficient opportunities for appropriate work and salaries for its citizens. In a poor economy with an inadequate growth potential, the return on human capital is likely to be low, leading to a limited incentive to acquire education. Allowing migration to take place from such an economy could thus increase the educated fraction of its population because of this incentive.

Given that only a proportion of the educated residents would emigrate, it could well be that in reality, the average level of education of the remaining population would increase.

Although simplistic in some ways, this viewpoint is further extended with the observation of the benefits given to countries of origin by their diaspora. At the 1999 UNESCO – ICSU World Conference on Science, Jean-Baptiste Meyer and Mercy Brown presented an important paper entitled: "Scientific Diasporas:

A New Approach to the Brain Drain". It is based on the idea that an expatriate scientifically skilled population may be considered as a potential asset instead of a permanent loss, if modern means of communication (Internet) are mobilised.

From brain drain and gain, has emerged the concept of "brain circulation" discussed by Johnson and Regets (1998) where they state: "This refers to the cycle of moving abroad to study, then taking a job abroad, and later returning home to take advantage of a good opportunity. The authors believe this form of migration will increase in the future, especially if economic disparities between countries continue to diminish." In considering "brain return" twenty years earlier, Glaser (1978) was of the opinion that the commitment to return to the home country is very strong amongst high-level personnel working or studying abroad, and that whilst many stay away longer than they initially planned, they eventually return to their home country.

A further term, "brain waste", describes the waste of skills that occurs when highly skilled workers migrate into forms of employment not requiring the application of the skills and experience applied in the former job or acquired through training (OECD Report, 1997). In Africa, this internal brain drain has been called PESA, or Personal Economic Survival Activities, where individuals trained in areas of science and technology are partially or fulltime employed elsewhere formally or informally. Another more subtle type of internal brain drain is seen in rich countries which are unable to convince their own brightest young people to study science and engineering subjects. Brain wastage which affects developed countries further worsens their hunger for outside sources of skilled manpower, and hence increases the severity of brain drain from underdeveloped countries.

Brain drain, brain gain, brain circulation, brain return, brain exchange, brain wastage, internal brain drain, and reverse brain drain are complex and dynamic global, regional and national processes and, therefore, changes are likely to emerge slowly and the idea that they can be controlled may be illusory. The solutions for different regions of the world are likely to be diverse, intersectoral, and probably driven by economic and political forces strongly influenced by the productivity of science and technology which radically and irreversibly affects the growth and development of nations. Paradigms based on notions of human capital, on countermeasures based on preventing/regulating flows of skills, or on canceling their negative effects through taxation, have not worked and have become de facto obsolete. The mobility of highly skilled manpower should rather be seen as a normal process wherein the real challenge is to

manage it as well as possible so that brain drain is turned into brain circulation with benefits for the individuals and countries involved.

Different parts of the world are differently affected by brain drain as illustrated below:

African and Arab countries are hardest hit:

- 37 per cent of the world migration of experts and specialists come from African and Arab countries;
- 54 per cent of doctors, 26 per cent of engineers and 17 per cent of scientists graduated from African and Arab universities migrate, in particular to Europe, the United States and Canada where they stay and work;
- More than half of African and Arab students who study abroad do not return to their homelands;
- The U.S.A, Britain and Canada attract 75 per cent of African and Arab experts *(10th Afro-Arab Parliamentary Conference Addis Ababa , 8-10/1/2003)*

Latin America is also strongly affected as illustrated by the following quotes from *Andrés Solimano, economist at the Economy Commission for Latin America and the Caribbean (Cepal):*

"Latin American countries spend a lot of money training scientists, but they end up leaving because of a lack of funding, jobs, or government interest in research. Their countries of origin are not seeing the benefits from their investment" and "… for every thousand Argentinians who emigrate to the United States, 191 are qualified professionals, scientists or technicians. In Chile the number drops to 156, in Peru to 100, and in Mexico to 26."

Some countries are fighting back as illustrated by the following quotes from the Asia region:

In Indonesia: "Universities in Indonesia are calling for greater autonomy, which they hope will help reverse the brain drain of science and technology graduates from the country. According to government statistics, more than 85,000 Indonesians study overseas each year. Many of these emigrate permanently" and "Leading institutions, including the

Bandung Institute of Technology (ITB), the University of Indonesia, and the science and technology campus of the Gadjah Mada University, are calling for reform of the education system. They want improved funding and more control over how they manage courses." *(Electronic Engineering Times, Sept. 2004)*

In India: "A government scheme intended simultaneously to address India's brain drain and strengthen research in universities is set to be revived after a long break. On 22 November, India's Ministry of Human Resource Development ordered the University Grants Commission (UGC) to reactivate its Research Scientists Scheme. Launched in 1984 by then prime minister, Indira Gandhi, the scheme has been dormant since 1992. The programme was intended to attract bright scientists working overseas back to Indian universities. Under the scheme, promising young post-doctoral researchers were offered full-time research positions in the universities of their choice." *(Source: SciDev.Net, 29 Nov 2004)*

In Malaysia: "Renewed efforts to lure home Malaysian scientists currently working overseas were announced by the country's prime minister last week in a fresh attempt to reverse the country's brain drain. The proposed perks include better pay, improved contracts and earlier retirement, as well as increased investments in research and development. Speaking during a visit to the United Kingdom, Malaysia's prime minister Abdullah Ahmad Badawi said that the country's losses, in terms of knowledge and money, were considerable, and that attempts by universities in other countries to lure Malaysian students were "tantamount to poaching"."

""It costs the government a lot of money to send our students overseas" said former prime minister Mahathir Mohamad last week. "[Those countries] should pay [Malaysia] for having taken away our graduates since, by right, the graduates' training and knowledge should be called intellectual property"." *(SciDev.Net, 30 July 2004)*

International organisations might play a new and positive role within these dynamics by working with the reality of the mobility of workers in science and technology and maximizing its benefits. It will require imagination and

creativity on the part of international organisations and governments to discover ways of ensuring an "equitable distribution of the benefits" of brain circulation. These may range from support for the involvement of African, Asian, and Latin American diaspora in meaningful research and development projects in their countries of origin, to support for building of infrastructure and higher education in poorest countries, and support for economic changes to attract investment.

There are two ways for a poorer country to achieve brain gain: through the return of the expatriates to the country of origin (return option), or through their remote mobilisation and association to its development (diaspora option). The growing phenomenon of diaspora involvement is illustrated in the Meyer & Brown paper (1999) which listed 41 "expatriate knowledge networks"; over 110 were listed in 2003. *A Diaspora Knowledge Network Working Group* met at UNESCO in October 2004 and UNESCO's objectives are described as aiming to "strengthen the capacity, sustainability, and effectiveness of Diaspora networks as a means of promoting brain gain – as opposed to current brain drain – through the use of ICTs."

Education and training of *people* must be accompanied by the building of secure, stable and sustainable *institutions* and *infrastructure*, if benefit is to be derived from these people's acquired skills in order to improve the economy and quality of life of their country. An initial solid base of technologically trained people can be further built up by facilitating the infusion of foreign capital through attracting investment from multinational companies, assisting in making the most of foreign aid funds and providing a basis for business development by local entrepreneurs.

In the knowledge-based world, international organizations can give support for the crucial role of ICTs (Information and Communication Technologies) in providing access to knowledge with fewer and fewer restrictions on geographical location. Some countries which suffer most from brain drain are among those with the least developed ICT base.

International organizations could play a larger role in assisting countries develop strategies to provide higher education to more citizens. While the millennium development goal of achieving universal primary education is a necessary commitment made by all members of the United Nations (The United Nations Millennium Declaration, 2000), attention should be paid also to the development of human resources to the highest level – necessary for achieving the MDGs in every country. Developing countries face severe challenges in giving their citizens access to higher education in terms of

accessibility, availability and affordability. The electronic delivery of services holds considerable promise for cross-border higher education. Assuming that cross-border providers rise to the challenge, governments will have to create Quality Assurance and Accreditation frameworks for some potentially very large providers. UNESCO and the OECD have formulated *Guidelines for Quality Provision in Cross-Border Higher Education.*

Conclusions and Perspectives: The time-honoured picture of brain drain, and attitudes to it, are rapidly changing. New approaches emphasize the *connectivity of knowledge networks* as the true human capital. In higher education and research, the combined potentials of cross-border education and of the mobilisation of diaspora – both underpinned by ICTs – offer novel perspectives. The role of international organisations can now move on from that of tax collectors for a moral equivalent of the Bhagwati tax, to that of prime movers and full partners in a collective effort to build an effective global network of educators towards the final of the MDGs: *"Develop a global partnership for development".*

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III Lessons Learned by Donors

Swedish Experiences of University Support and National Research Development in Developing Countries

by Tomas Kjellqvist, Head of Division for University Support and National Research Development Department for Research Cooperation, SIDA

Abstract

This paper describes the Swedish experience of research cooperation with developing countries. Sweden has been one of few donor countries that have acknowledged the need to strengthen research capacity at an institutional level, rather than granting training of individuals and research project support. Recently major actors in the donor community have rediscovered the significant role of science and technology for development. From the Swedish experience Sida (Swedish International Development Cooperation Agency) suggests three areas where universities and national knowledge systems need to be strengthened: Research Policy, Research Environments and Research Management. The first and the last require that donors cooperate to assist developing countries in their setting up of conducive mechanisms for research. External support for the strengthening of Research Environments should be aligned with National Policies and Research strategies both at national and University level. In Sida's experience cooperation between universities in developing countries and Sweden has proved to strengthen both local research environments and international scientific information exchange.

Introduction

The Millennium Goals and the quest to combat poverty before the year 2015 are among the greatest challenges that humans have tried to meet. Meeting these challenges requires mobilization of all possible resources, both in society and nature, in rich countries as well as in the poorest countries. Fundamental to efficient and sustainable utilization of these resources is good governance. One of the foundations for good governance is qualified knowledge about the limitations and possibilities that nature, politics and technology could offer. Such qualified knowledge is lacking in poor countries, both regarding indigenous knowledge production and the ability to assess and adapt external knowledge to local conditions. This lack severely hampers the informed decision-making required to make viable strategies to combat poverty.

The major explanation to this lack of qualified knowledge is the past inability to construct coherent education systems in poor countries. Urgent needs to expand basic education have disfavoured secondary, vocational, tertiary and academic education. There are many constraints to education systems in developing countries, but generally speaking, quality could have been improved with a more holistic approach to the different levels of education. Instead skewed education efforts have led into vicious circles: without Higher Education to train teachers, primary education get low quality and poor output, leading to weak entrance rates to secondary schools and vocational training, which again makes it difficult to recruit students to universities with sufficient basic knowledge. Previous politics for education has created a deficit of skilled human resources in developing countries.

From the lack of academically qualified human resources has followed severe incapacity to conduct locally based research and to adapt international scientific findings. A national research capacity is a good and necessity for the nation, but it also makes it possible for the country to share and contribute to the stock of global public goods. Scientific communication facilitates such sharing of own research results, and validation of these through multiple trials and experiments by researchers in many countries (both developed and developing). It also makes it possible to test research results from abroad in a local context. This communication process safeguards academic scrutiny and quality which in turn makes it possible for local researchers to give valid and credible advice to policy makers. With research capacity built up at least at one university in poorer countries the curriculum of higher education and at secondary schools could be adapted to the country's development

strategies. Research based curriculum would at the same time bring in relevant international knowledge frontiers and to encompass local perspectives.

Experiences of Swedish research cooperation with developing countries

The arguments above were very much the motive to include knowledge as an essential part of development cooperation already when Sweden started Research Cooperation with Developing Countries in 1975. The two complementary objectives stated in the original policy for Research Cooperation are still valid:

- To facilitate research of relevance and utility for development
- To build capacity for research in developing countries

The modalities to work for these two goals has since then been to direct financial support to international research organisations, to regional research networks and to national research bodies, through bilateral research cooperation. The thought behind this division is that these three levels would reinforce each other through the international scientific communication processes pertinent to the academic system.

The Swedish engagement in bilateral research cooperation has been a learning process. The first 10 years could be characterized by support to national research councils. An evaluation of this period showed that, in most cases, these bodies lacked the capability to make priorities of research based on scientific criteria. Decisions were merely political which did not safeguard the quality of the knowledge produced. A countermeasure during the next period was to strengthen research capacity through research training using the so-called sandwich mode, which is still in use. This modality differs from ordinary research scholarship systems that detach the student from the local context. In the sandwich mode students spend time at Swedish Universities for coursework, analysis and writing-up, while the empirical research is formulated with a local perspective and with data collected from the local context.

At first, research students were identified among staff in ministries, at research institutes and at university departments. Over time it became obvious that training of researchers had to be supplemented with investments in research infrastructures and scientific equipment. To cater for needs of

scientific information support to libraries, and archives, was included in the approach. The sum of these should contribute to the establishment of research environments that would be attractive work places for the researchers trained in the bilateral programs. Through these additions the support gradually became more institutional than individual. As a result, choices had to be made regarding the selection of grantees. At the beginning of the 1990's a shift was made to favour more comprehensive support with the aim to inculcate research cultures at national public universities. The university as a researching institution was given priority before research institutes because of its connection to higher education. Supporting the university was regarded as more sustainable investments, with the possibility to engage in long-term processes that would lead to the establishment of local research training.

The decision to support national public universities was contemporary with a movement of university reforms. In most poor countries the 1980's had been disastrous to universities, in some cases through financial neglect, in others through political obstruction of the academic freedom. With democratization and liberalized economies came an increased demand from students and university teachers to improve the situation for higher education. The Swedish Research Cooperation was seen as a tool in this process and was aligned with the strategic plans that universities developed to guide their reforms.

The main provision for support was that research should be part of the strategic plan and that university teachers should be given the opportunity to engage in research or research training. Although this is part and parcel of most university reform documents, practice has proved that there are many barriers for the researching university to materialise. According to the Swedish experience the main responsibility to overcome these barriers could be attributed to the levels of governance and management.

The need for research must be recognised not only by the University management also by Government through appropriate ministries. The resources available for research must be governed through National Research Strategies that align with strategies for Development and Poverty Reduction. Furthermore, National Research Strategies must not be shopping lists, but rather be elaborated to a level where they are fundable and assigning missions for the actors in the National Research System. The Swedish Bilateral Research Cooperation for some years, with some difficulty, has tried to engage at the level of National Research Policy. Recently a number of international initiatives have placed Science, Technology and Innovation on the agenda. Hopefully this will facilitate the dialogue with governments and harmonisation within the donor

community to encourage the development of National Research Capacity based on plans and strategies for Science, Technology and Innovation.

The Swedish experience also has shown that a properly working Research Management is necessary at the level of research implementing organisations. This research management should safeguard that research conducted is in line with governmental and university strategies, promote that researchers generate own ideas of research topics, and assist researchers to attract funding from possible sources. The research management should also guarantee a properly working financial administration of internal and external research grants, and assist researchers to find proper channels for research outputs through scientific journals and to potential users in the public and private sectors. Sida has developed a number of instruments to establish and strengthen such units at universities, but this still remains a challenge to the Swedish Research Cooperation.

The following sections of this paper will describe how the new Swedish Policy on Global Development emphasises the experiences made by Research Cooperation and the need to further elaborate the instruments that has been developed through the 30 years of Swedish Research Cooperation with Developing Countries.

Research cooperation within the new aid architecture

The Government Bill 2002/03:122 Shared responsibilities – Sweden's policy for global development passed the Parliament in December 2003. This Government Bill grasps the new opportunities provided by globalisation and strengthens Sweden's international efforts in support of the

Millennium Development Goals. The Bill encompasses all areas of policy and proposes a common objective: to contribute to an equitable and sustainable global development.

A new focus within Swedish development cooperation is presented, placing a greater emphasis on developing countries' own responsibility for development. At the same time, the Bill underlines the responsibility of the richer countries to increase their transfer of resources and enhance the efficiency of cooperation activities. The proposed new objective for Swedish development cooperation is to help creating conditions that will enable the poor to improve their lives.

Two perspectives permeate all parts of the policy: a rights perspective based

on international human rights conventions; and the perspectives of the poor. The content of the policy is formulated with respect to eight central thematic areas and component elements. These elements are:

- Sustainable Development
- Peace and Conflict Resolution
- Economic Growth
- Social Development
- Democracy
- Human Rights
- Equity
- Global Public Goods

It is obvious that all of these areas involve topics for research. National universities could contribute with analytical tools to understand the situation as regards the elements. For Sustainable social and economic development universities could participate in developing innovations of importance to the implementation of national and local strategies. Furthermore, promotion of Universities as a foundation for the national knowledge system is one prerequisite to make endogenous knowledge production sustainable. Universities may also contribute to increased Democracy, Human Rights and Equity, and they have a key role as bridging points for Global Public Goods. Hence the Swedish support for research Cooperation with Universities in Developing countries is well in line with the intention of the Government Bill.

Sida has also developed an internal document "Perspectives on Poverty" that describes Poverty as being context dependent, with a multitude of causes, which calls for Poverty reduction strategies that arrange a number of specific interventions, of which research is one, into a holistic approach. In Sida's interpretation of the new policy, the two perspectives and the eight central component elements are dependent on the context in each collaborating country, and the balance between them must be set in accordance with national strategies for poverty reduction and development. The development of domestic research is seen as an important tool for poverty reduction.

In the Paris Declaration for Aid Effectiveness 2005, Sweden among other countries, has agreed to make Development cooperation more effective with an increased alignment of aid with partner countries' priorities, systems and procedures and helping to strengthen their capacities.

The emphasis on ownership and poverty reduction have always been a guideline for Swedish Research Cooperation, but the new Policy and the Perspectives on Poverty has called for a sharpening of the strategies for Research Cooperation and the tools used. The principle of aligning research cooperation with the university system in each country has been increasingly done since the 1990's. Recent shift of emphasis in the international approach towards science and technology as essential for development and poverty reduction has opened new possibilities to extend this approach into the entire national knowledge system. This shift of demand also provides new opportunities for Sida's old wish to harmonise with other research funding agencies.

The policies and agreements mentioned above, together with other efforts to construct a new architecture for aid could be summarised as follows:

- Perspectives on Poverty and Rights require that interventions are scrutinised in relation to their potential effects for poor people and for the spread of the UN conventions on Human Rights. The Swedish goal for development cooperation is to help creating conditions that will enable the poor to improve their lives. Research cooperation can only indirectly assist the poor themselves, it has only indirect connections to the UN conventions but it can directly assist a country to build up the foundations for knowledge that create the enabling conditions.
- Multidimensional explanation to causes of poverty requires multidimensional and contextually defined approach. In the Swedish Policy this is formulated in the eight central component elements. Research capacity building could be done in each of these areas, and gives access to some of the arenas where Global Public Goods are shared.
- Emphasising Ownership
- Alignment with national structures
- Joint Funding
- Harmonisation

Research cooperation as part of poverty reduction and development cooperation: demand for and supply of knowledge

The section below describes three aspects of the shift of demand for research in development cooperation, followed by a description of how Sida perceives that the domestic supply of research based knowledge could be strengthened.

Demands for knowledge

Describing Knowledge for poverty reduction is connected to a great risk of reducing knowledge to instantly demanded needs for know-how. Research based academic knowledge has a far greater potential than so. One of the main features is that it should always be subjected to quality control through peer review. Through this peer review domestic research links up with the international academic knowledge base, part of the Global Public Goods. A foundation for this body of knowledge is that it origins in the curiosity of researchers. Principles for academic freedom have been set up to safeguard that this curiosity should be allowed to work regardless of political conditions. In reality governance of research always puts number of restrictions and guidelines, of which some are derived from the situation in which a country finds it self. The following three aspects try to summarise some generalities that pertains to knowledge for poverty reduction in developing countries.

Knowledge for empowerment

The lack of a domestic research based knowledge means that developing countries are badly equipped in international negotiations, which maintains a situation of dependency. Agreements within international bodies may pass without the effects or preconditions for developing countries are analysed. Major investments that need foreign technology may be done without sufficient knowledge to assess if the procured products meet the requirements. Domestic research has a potential for national empowerment in this respect. The development of domestic knowledge could also empower the poor through various mechanisms by the development of new procedures and products derived from research results. Also dissemination of research results through the educational system and other channels provide a general increase in knowledge that may benefit the poor.

A sustainable knowledge economy

Globalisation has led to an increased emphasis on knowledge as one of the major factors in international economic competition. The previous neglect of domestic research from governments and the donor community has postponed the possibilities for developing countries to enter into such competition. Most developing countries have natural resources that could be refined to high-value products with knowledge and innovation, thereby contributing to economic growth. Unfortunately, most developing countries also has harder natural conditions than developed countries which means that knowledge is needed to safeguard that exploitation of the potential products is made environmentally sustainable.

Increased demand for higher education

Population growth in developing countries has created an increased demand for higher education. Most countries show an increased number in the age cohorts that are potential university students. With economic liberalisation and increased democracy higher education has become seen as a lever for social mobility. This demand manifest itself in an increased number of students applying for university and the growing interest in establishing private universities to cater for this demand. Governments are now faced with the necessity to come up with regulatory mechanisms and innovative funding strategies. Research and research training at the public universities also get a new role as provider of academic staff, not only for their own faculty but also for the entire university system.

Supply of knowledge

Each country has its own system for the supply of knowledge. These are products of different types of interventions throughout history and rarely a result of a comprehensive strategy. Reforms are often called for but diverging interests within the system and ignorance from external stakeholders contribute to a status quo. In this situation that has persisted for a number of years, Sida has assessed some interventions as crucial and to be of a kind that contributes regardless of future changes in the system. A focus on strengthening universities as the main bodies for research and research training provides a good foundation for the development of knowledge, human resources and experiences of knowledge strategies on a larger scale than a single research institute could provide.

At least one research university in a country

The combination of research, research training and undergraduate education makes the university stronger and more sustainable than individual research institutes and researching NGOs. Supporting the university to strengthen good research environments in many subject areas provides a foundation for future research and research training. Doing this within one university could facilitate multidisciplinary research as well as interdisciplinary. Dependent of the strength of the national university system, Sida choose different strategies to focus research funding. In a weak system funding would go to one university rather than diluting it to many weak universities. In countries with stronger systems, resources could be spent on the research environments with best potential. The idea is that each country should establish at least one researching university that could cater for the needs of the country and eventually become a resource for the creation of a more extended university system and for national innovation systems.

Links to the international academic community

No university is stronger than its links to the international academic community. Sida has chosen interventions that contribute to strengthen such links, both to international research institutes and through regional cooperation in networks and organisations. Research training could be conducted in collaboration with other universities, in the north or with more developed university departments in neighbouring countries. Collaborative projects between researchers interested in the same topic form another opportunity. Other interventions link up universities to the Internet for communication and access to international scientific journals and databases. Support that facilitates for researchers in developing countries to participate in international scientific conferences makes other links available. Also support to international and regional organisations that promote issues of higher education and research contributes to involve collaborating university in wider networks.

Curiosity driven and basic research as foundations for innovation and policy-formulation

Sida's opinion is that a researching university must have the ability to conduct curiosity driven, basic research to be able to respond to demands

and strategies. Without this ability the university loose possibilities to act pro-actively and strategically. Instead it gets restrained to react to current funding opportunities which risk reducing the quality of research. Interest for research in the Development aid community is by tradition focused on demand-driven applied research of direct value for policy-making or project implementation. Recent trends focusing on innovation tend to emphasise the same end of the research spectrum, though with a more strategic and systemic approach. Sida's support combines support for basic research as well as applied, and has mechanisms to promote curiosity driven research as well as capacity to respond to demands.

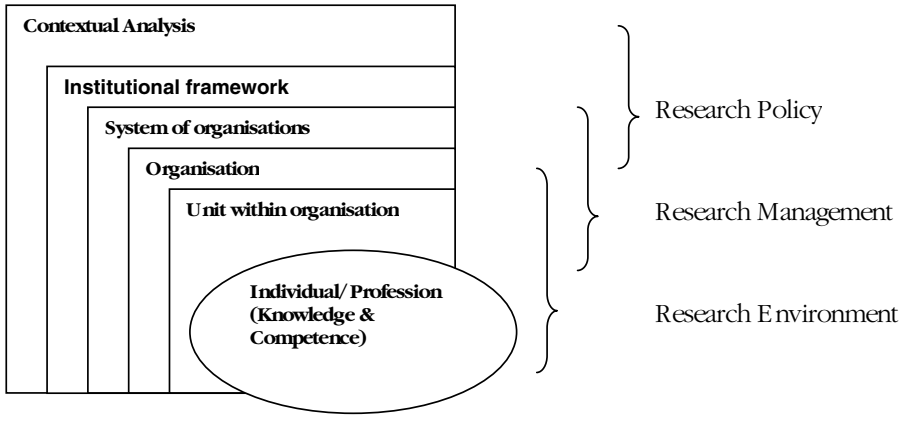
Research cooperation as capacity building

Sida's strategy to fund the basic prerequisites for research at universities has produced a number of research environments over the world that could contribute to development and poverty reduction. However, to realize this potential much more need to be done by governments and the development aid community.

Sida is active in various types of capacity development, where research capacity building is one. To analyse and compare different types and modalities of capacity development Sida has established a policy including definitions and a common language. The diagram below shows to the left a summary of the thinking in Sida's policy for capacity development in respect of target levels. In a certain, given external environment there is capacity in the form of

- Individuals/professions
- Organisational units
- Organisations
- Systems of organisations, and
- Institutional frameworks.

Everything is related, but depending on the analysis of the problems and Sida's ambitions, Sida can choose to support capacity development at one or several of these levels. To the right of the diagram three modes of support for capacity building are shown, with brackets defining how they relate to the policy for capacity development.



When a national Research Policy is formulated it takes into consideration the contextual analysis, reviews the institutional framework, sets up the system of organisations and defines roles of each organisation and how they relate to the system, institutional framework and context. Sida is challenged to find ways of assisting national efforts to improve national policies and strategies for research, science, technology and innovation. Some areas of intervention are described below.

Research Management refers to how a Research policy is implemented, within the systems of organisations, and within the organisations and their units. As Sida prefers to work with universities for research capacity building this area of intervention refers to support for efforts to strengthen management and management tools at university associations, universities and faculties.

Building strong Research Environment has been at the core of the Swedish Research Cooperation. It includes of course the training of individual researchers, research supervisors and research coordinators, but also investments in the facilities necessary for performing research. The concept of research environment, in the context of Sida's research capacity building scheme, refers to the levels of organisations, units of organisations and individuals.

During the coming years Sida will explore new methodologies to assist countries in setting up and strengthening National Research Policies, develop research management and further strengthen research environments. The approach to development of these methodologies will be experiments based on experiences, looking for the opportunities given by advancements in each of the countries with which Sida collaborates. Hence, where there are advancements

on the level of research policy, Sida will try to find the best way of supporting in alignment with the national context, where there are emergent research environments Sida will try to find the best way of supporting according to the local circumstances. Strengthening of Research management will be the most "forced" endeavour, as accountability and transparency are part of Sida's strategic priority to combat corruption. Also, good research management is a prerequisite if developing countries should make the best use of what different donor agencies are offering. The best donor coordination would be the one executed by the universities who are about to strengthen their facilities for Research and Higher Education.

Donor Experiences from Capacity Building Proposals Related to Knowledge Society Construction

by Finn Normann Christensen,
Secretary-General, DANIDA/ENRECA

Abstract

The Danish Bilateral Programme for Enhancement of Research Capacity in Developing Countries (ENRECA) has achieved good results in building public sector research capacity in developing countries at the project level. The experiences have also shown that it is difficult to integrate support for research capacity with the other parts of the Danish bilateral assistance programme and that the programme for capacity building predispose initiative by the Danish partner. It is also difficult to maintain the interest of Danish research institutions if the projects focus on capacity building rather than research.

Danish assistance to research capacity in developing countries constitutes only a small share of the development assistance programme and a minor component of the brain drain phenomenon. The Danish support for research capacity in developing countries is based on the idea that the mastery of technology and innovation provides a comparative advantage and leads to economic growth and development. In that respect the original idea of the programme is based more on traditional development theory than the concept of the international knowledge based economy and information society. As far as the "brain drain" is concerned the projects of the programme has led to positive results and many of the challenges faced by the programme reflect that Danish development assistance is directed towards the LDCs.

International Academic Exchange between Capacity Building and Brain Drain – the Case of the German Academic Exchange Service

by Michael Harms, Head of Section Postgraduate Courses for Professionals from Developing Countries, DAAD

Abstract

Academic exchange requires mobility. For many generations, the German Academic Exchange Service (DAAD) has enabled young and qualified students, graduates and scientists to leave their home country in order to spend some time at foreign institutions of Higher Education. Literally hundreds of thousands academics have been invited in the past six decades to study and to do research in Germany, many of them from Developing Countries. Although the very idea of "exchange" suggests a two-way traffic and possibly also a limited stay in the host country, there can be no doubt about the very real danger of a long term "skimming off" the academic and cultural cream especially of poor countries.

The German Academic Exchange Service finds itself in a potentially awkward position. On the one hand, it is a self-administrative body of the German institutions of Higher Education, which have their own interest in talented foreign graduates and promising researchers. On the other hand, however, it is an intermediary organisation with the explicit goal to promote the academic, scientific, economic and democratic advancement of developing and transition countries. Over the years, DAAD has developed several strategies in order to counterbalance the possible danger of brain drain; the speaker will introduce several approaches like the "sandwich" PhD-scheme

with partner universities in the south, examples of "cross-border education" in Master Courses and in-country fellowships.

International academic exchange between capacity building and brain drain – the case of the German academic exchange service

Academic exchange requires mobility. For many generations, the German Academic Exchange Service (DAAD) has enabled young and qualified students, graduates and scientists to leave their home country in order to spend some time at foreign institutions of Higher Education. Literally hundreds of thousands academics have been invited in the past decades to study and to do research in Germany, many of them from Developing Countries. At the same time the DAAD has been able to support generations of German students, researchers and scientists in their drive to study and work at a foreign university in almost every country on the planet. Most of the exchange programmes are open to all disciplines and all countries, to foreigners and Germans alike, academic excellence being the main criterion for the selection of participants. With its various scholarship programmes the DAAD can support around 50,000 people per year with an annual budget of approx. EUR 250 million. Although the very idea of "exchange" suggests a two-way traffic and also a limited stay in the host country, there can be no doubt about the very real danger of a long term "skimming off" the academic and cultural cream especially of poorer countries.

In this context, the German Academic Exchange Service finds itself in a potentially awkward position. On the one hand, it is a self-administrative body of the German institutions of Higher Education, which have their own interest in talented foreign graduates and promising researchers. On the other, however, it is an intermediary organisation with the explicit goal to promote the academic, scientific, economic and democratic advancement of developing and transition countries. To understand the framework under which the DAAD operates its funding guidelines and programme designs, a quick look into its structure is inevitable. Although the German Academic Exchange Service receives most of its funds from German ministries, it are not a governmental organisation, but a self-administrative body of the German institutions of Higher Education. Obviously, this is a significant difference as the members, the German Universities and Institutions of Higher Education, have a very

important say in formulating policies and programmes. Notwithstanding, being provided with the necessary financial means almost solely by the federal state, the German Academic Exchange Service is also a semi-official intermediary organisation which has to take into account the priorities of German foreign cultural and academic policy, development co-operation policy and national higher education policy. In this construction, one may assume the idiomatic "squaring the circle". Yet, the intermediary role of the DAAD has over the years proved to create a win-win-situation: For German institutions of higher education, DAAD-programmes offer an opportunity for involvement in international activities and funds, which would not otherwise be available. For government authorities, the programmes provide access to human resources and infrastructure of the whole German higher education system. Due to its „semi-governmental" status (public institutional funding but independent decision making on schemes and programmes as a self-administrative academic organisation), the German Academic Exchange Service has not to compete with other agencies for public funds. It rather organises the competition of individuals and institutions for scholarships and funding of projects and an impartial decision making by selection committees. Fortunately, the DAAD is not tied to sectoral or regional priorities of national or international development policies or of the „donor community" in designing its programmes.

To promote the academic, scientific, economic and democratic advancement of the developing and reform countries is actually one of the five strategic objectives of the German Academic Exchange Service. The DAAD strives to achieve this goal by educational co-operation with our partner countries in a variety of programmes. In 2004 forty-two per cent of all of the funds available for globally promoted programmes were used for the academic co-operation with developing countries. Nearly half of our foreign scholarship holders came from these countries while one quarter of German students went abroad to developing countries. The imminent danger of brain drain to the detriment of the developing world forms a very important impetus when it comes to programme design. Thus, over the years, the DAAD has developed several strategies in order to counterbalance the possible danger of brain drain; some of which will be presented in this article.

"In-country" scholarships

Universities in the South have successfully established regional centres of excellence, dealing with prominent issues of development in teaching and research. The "in-country/neighbouring country" fellowship programme of the DAAD has been initiated as early as 1962 by African partners. It offers fellowships on Master's and PhD levels which enable highly qualified local students and students from neighbouring countries to make use of these training opportunities. The programme is operating on a fee-paying basis and thus strengthens the host institutions. It stimulates south-south student mobility and the emergence of regional teaching and research networks. The total number of scholarships granted per year under the "in country" scheme amounts to approx. 350. Forty-six training institutions in Africa, Latin America and South Asia are involved.

An example of such a regional centre of excellence is the International Centre of Insect Physiology and Ecology (ICIPE) in Kenya, in which 11 countries participate. Scientists work in multi-disciplinary teams in insect science and on related issues of plant-, animal-, human and environmental health. ICIPE has established the African Regional Postgraduate Programme in Insect Science (ARPPIS) to support staff development at African institutions of higher education and research. The DAAD has supported ICIPE with more than 70 scholarships for Master or PhD candidates.

Keep the links with the home university alive – the "Sandwich"-scheme

A full PhD programme at a German university, including preliminary language training for foreign students, requires four years or even more. The formal requirements to obtain the degree in Germany (recognition of previous qualifications, compulsory additional subjects of study etc.), may extend the stay abroad without adding much value in scientific terms even further. Such a long absence from home can in some cases cause cultural and social alienation and reintegration problems and affect career prospects after return or – in the worst case – result in a somewhat long-term brain drain. The so-called "Sandwich" fellowship is offered as an alternative option of PhD training solely at a German university; students spend study phases both in Germany and in their home country. Their research is jointly tutored by German and

local supervisors, the degree is awarded by the home university. As part of this co-operative scheme, funds are also made available for visits of the supervisors at each other's university at various stages of the PhD-project, thus creating lasting personal and institutional links. A prominent alumna of this programme is the Nobel Peace Prize Laureate 2004, Professor Wangari Maathai of Kenya. She did part of her PhD-studies as a DAAD-fellow between 1967 and 1969 in Gießen and Munich in Veterinary Medicine and subsequently earned her degree at her home university in Nairobi.

Study programmes with special relevance to developing countries: postgraduate courses for professionals

For almost 20 years now, the German Academic Exchange Service has been supporting professionals from Developing Countries with an exclusive scholarship scheme. This fellowship programme enables young executives from southern (and in fact eastern) partner countries to obtain a master's degree at a German university in courses with special relevance to the needs of developing and transition countries. The primary concern of the scheme is to further qualify junior management staff from various sectors – ministries and other government authorities, trade, commerce, industry, administration and NGO's. Upon return, grantees are expected to go back to their home country and apply the knowledge they have acquired for the benefit of their countries development. In many cases, the participants go back to their established work-places and climb up the career ladder – becoming decision-makers and partners for future development co-operation. A recent tracer studies has revealed that the programme actually meets the high expectations; more than three out of four Alumni return at the end of their study in live and work in their native country or region; and out of these a high number hold senior management positions.

The core concept of the programme can be described as a long-term investment in the human capital of developing and transition countries. Moreover, it is demand-driven. The thematic subjects of the courses reflect needs and requirements of our partner countries – to a large extent the courses are designed to make a contribution towards achieving the Millennium Development Goals: a course in medicine to combat HIV/AIDS, malaria, and other diseases; studies in various environmental sciences to ensure ecological

sustainability; courses with regards to good governance and economics in order to develop a global partnership for development to name but a few.

Support cross-border education

Almost all German universities on the aforementioned scheme work closely together with partner institutions in developing and transition countries. The DAAD has prompted and supported these close ties between institutions of higher education in the North and the South with a whole range of programmes (e.g. subject-related partnerships). As a consequence, many examples of cross-border education have evolved where modules or whole semesters are taught by one or several partners in the south. The DAAD regards these joint ventures as staff- and institution-building of a special kind; furthermore it is convinced that the importance and significance of cross-border education will constantly rise in the foreseeable future. Thus, it came not as a surprise, that one result of a recent conference on "Cross-border Education in Development Co-operation" organised by DAAD and HRK (German Rectors' Conference) was the request of participants to position the topic of cross-border education and development co-operation more strongly also on the political agenda. By doing so, it is intended to create awareness and stimulate debates on the long-term implications of the new zeitgeist of the increasing market-orientation of higher education and research policy which is a potential hindrance of cross-border education. At the same time the conference participants agreed that joint ventures with partners at eye-level can be an effective tool against brain drain if all parties involved can agree on criteria of successful cross-border education by taking into account different approaches and goals in science and higher education.

From individual to institutional co-operation

Academic exchange creates personal ties and "informal" working contacts between individuals. The structural impact of these relationships can be increased by transferring them into institutionalised co-operations. Since 1997, the DAAD supports German universities which enter formal relations with partner institutions from the south and propose joint projects. Funding is granted for mobility costs and to a limited extent for equipment and staff. The

programme encourages the establishment of multilateral networks and south-south co-operation. Most of the 235 projects which have so far been supported combine the development of joint curricula, training modules and degree programmes with applied research; some typical examples are flood protection (China), reform of teacher training (Mozambique), rehabilitation of Agent Orange-affected forest (Vietnam), labour law (South Africa), sustainable agriculture (Cuba and Mexico), integrated watershed management (Tanzania, Kenya, Ethiopia, Uganda), technomathematics (Sri Lanka, India, Indonesia, Ethiopia), regional planning (Myanmar), architecture of the tropics (Mali). Experiences and feedback show that institutional capacity building through subject-related partnerships can be a very effective way to open up a real perspective for returning researchers at their home institutions.

Alumni

Last but not least, the DAAD regards strong and lasting links to its Alumni as an efficacious antidote against brain drain. Continued support for former fellowship holders by equipment grants, scientific literature and invitations to seminars and conferences can be described as a standard feature of the fellowship programmes of the DAAD. Furthermore, all ex-grantees can apply for a re-invitation scheme which gives them the opportunity to return to their host universities for shorter periods of further training and research.

A wider approach, which is not limited to former DAAD-fellows, has been taken towards the support of Alumni from developing countries since 1999. It stimulates the German universities to "discover" the potential of their Alumni from developing countries as partners for further co-operation. At a first stage, assistance was rendered to establish a valid database. The second step was the launch of an "Alumni Programme", which funds joint projects of universities and their Alumni. In workshops, expert training seminars and summer schools, usually held in developing countries, former students acquaint themselves with latest scientific developments in their fields and their application in the development context.

The most advanced projects have arrived at concepts of continuing education and life-long learning in virtual disciplinary networks, linking Alumni in a particular region or even creating global platforms for disciplinary and interdisciplinary networking. An example is the "Alumni.med.Live" initiative of Heidelberg University and a consortium of universities in Germany, China, Brazil, Syria and South Africa. It has drawn up a full content, constantly

updated, web-based medical continuing training programme, to be combined with real-life training components and follow-up activities in the respective countries.

Academic exchange requires mobility. But mobility which fails to ensure the return of the well educated change agents who have been qualified in the North is worthless. Thus, efficient programmes and donor strategies need to be geared towards the ultimate objective of winning permanent partners who actually do return. More than five decades of academic co-operation with developing countries seem to indicate that the German Academic Exchange Service has found ways to achieve that goal – even if brain drain cannot be completely avoided.

IV Lessons Learned by Universities

Lessons from Building a Research Network (SUDESCA) in Central America

by Leiner Vargas Alfaro, Academic Director, CINEPE-UNA, Costa Rica

Abstract

The increasing role of innovation and innovation policies in sustainable development has been demonstrated by research activities in the Sustainable Development Strategies for Central America (SUDESCA) research network in Central America. The development of a common set of values and theoretical approaches to analyze those policies has been a specific focus topic in the SUDESCA network which includes research groups in Costa Rica, El Salvador, Nicaragua and Denmark. The building of research capacities on innovation and sustainable development has been done under a particular set of conditions and it has, partially, achieved the initially proposed objectives.

The project

The project has succeeded in developing a network of researchers from both sides of the Atlantic Ocean focusing on rather new issues related to national, local and sectoral innovation systems and sustainable development. Even if the process of building institutional and individual capabilities has been interrupted prematurely by lack of funding, the lessons learned and the seed activities, which were carried through, have promoted new activities of applied university research, which have contributed to a redefined regional agenda for innovation and innovation policies.

The time framework and the available resources were quite limited in relation to the objectives of the rather ambitious research program, especially

when considering the regional character of the research and the number of organizations involved. The coordination activities as well as the level of enthusiasm within the research groups have been quite different and, so far, the results also reflect these different levels of capacity building. The counterparts who benefited most were the International Center for Economic Policy (CINPE) and the National University (UNA) in Costa Rica in spite of the fact that the main focus of interest was Nicaragua. However, within a broader regional vision the agenda has been very much affected by nation state priorities.

The quality of the research in the network clearly improved, but it must be concluded that it takes a lot of time and long-term investments to produce important changes in the existing research agenda and the local research conditions in the Central American region. A focus on already existing promising clustering activities should be preferred to creating new programs based on very limited local capabilities. In this respect mayor lessons were learned from the experiences of the University of El Salvador.

The focus on sectors and issues of increasing political priority as environmental and local development were also sources of important lesson for the SUDESCA project. Applied research under a concrete and unifying framework such as the "systems of innovation approach" was also interesting. It has allowed the participating research groups to get into contact with new researchers and organization sharing common goals and methods.

Both the south and the north may improve their research capacity by network building and research cooperation so building capacity in developing countries is not just a transfer of a particular research technology, it is also a process of trust building and knowledge sharing and of developing a common research agenda. Learning from and with the south (the importance of intercultural learning) is a crucial lesson of the SUDESCA research network.

The network was developed with a balanced attention at both education and research capacity building. During the first phase the research activities concentrated on building basic statistics and an information background. Improving methodology as well as adapting "System of Innovation" concepts to the south were done during the first part of the second phase. The definition of local interest themes was done in cooperation between experienced researcher from Denmark and local people from Central America. During the whole second phase the learning tools were developed both within a common research activity and parallel PhD activities. This has created – particularly under the second research phase – increased trust between and within the

group, not only within the south but also at the counterpart at Aalborg University (AAU).

Learning between cultures and within cultures was emphasized because of differences in language, local conditions and research orientation. For example, understanding the local conditions for research under different political and social situations was of crucial value. Qualitative research became an essential tool due to the difficulties in getting reliable statistics in Central America. Learning from doing and learning by interacting with local actors were crucial elements in the development of specific hypothesis and research cases.

Universities in Central America have been affected by different political and social events during the last century; particularly those countries north of Costa Rica due to the political and social conflicts in the sixties, seventies and eighties. They have lost much of the social trust in relation to some economic sectors and social groups. Local research capacity was reduced because a whole generation was lost and university budgets were constrained to a minimum under this political context. The concentration of SUDESCA research activities on innovation systems and sustainable development, both very relevant issues for the society, was a perfect opportunity to contribute to recovering the trust between university and society. Learning with and between social groups was an un-expected result of the project, particularly in Nicaragua, where the local group at the School of Agricultural Economics (ESECA) became part of national discussion. It was a relevant result also in El Salvador, but the results were mainly achieved by a non-governmental organization, National Foundation for Development (FUNDE). The Costa Rican case was a different because the university-society relation was clearly another from the very the beginning.

We have learned that University research agendas in developing countries should concentrate on issues where the society could benefit not only in macro-economic terms, but also in terms of local values and local groups. University capacity building is in this respect a sustainable way of affecting local capabilities in research conditions. But it is not a sufficient condition; countries need to stimulate a virtuous circle between research capacity building and development of local university conditions in order to create a sustainable process.

Finally, in relation to donor roles, we could say that a stable and long-term financial program is a very important aspect in order to get results. Once this is achieved, concentrating on local existing groups is an important aspect. Much donor help is used to build capacities almost from scratch; generally this only

achieves meager results because it is a long-term process to construct local capabilities. Cooperation based on existing local capabilities should help to complement the local capabilities with external capabilities and thus reduce the risk of failure. One example is English language skills.

The Experience from an ENRECA Capacity Building Project

by Henrik Secher Marcussen, Professor, Dept. of Geography & International Development Studies, Roskilde University

Abstract

In the light of globalization processes, it is in vogue by Western nation States to emphasize how vitally important it is to give top priority politically and financially to research and tertiary education. However, often such words are not met by deeds. In the case of the developing world, the need for getting aboard the globalization train is no less urgent. The increasingly important role of China and India in the global economy bears witness to the crucial role which so far only a few developing nations have succeeded in having.

Unfortunately, however, this aspect does not play an important role in Danish aid priorities, where support to primary education is targeted, while research is funded mainly through sector-wide programmes, through applications for grant through the RUF-system (Research Council for Development Research) or by means of the ENRECA form of assistance to capacity building.

Based on a review of a Danida supported ENRECA project in Burkina Faso, it is the objective of this contribution to try to assess how relevant and how effective this form of assistance to build research capacities in the developing world is. In doing this, the contribution tries to answer four interrelated questions: (i) Has the ENRECA project succeeded in meeting its own targets?, (ii) Has the project contributed to building national research capacities, filling a role in a national research and research policy chain?, (iii) Has the project contributed to improving on Danish aid performance in the country; and (iv) Has the project assisted Burkina Faso in meeting demands arising from an increasingly globalized world.

It is the conclusion of the article that, as based on the example reviewed,

none of the four questions can be answered fully in the affirmative. Instead it is argued that a fundamental review of the ENRECA concept is needed, if this form of assistance may have broader impact, within the national context as well as beyond.

Introduction

In 2000, the Danish Ministry of Foreign Affairs decided to commission a major review of Danish development research based on the ambition, as expressed by the then Minister of Development Cooperation, Jan Troejborg, that "In the future, research will have a much stronger position in Danish aid…" (Ministry of Foreign Affairs, 2001, p. 8). In the Chairman's Preface to the Commission Report, it is further stated:

"At a time of rapid change in the world, and also about greater uncertainties about future development trends, it was felt opportune to appraise the role of Danish development research sector and the contribution through research, teaching and consultancy to international as well as Danish development goals, and to formulate a new strategic framework for future Danida support to guide participants in the sector.

Hence the Commission was established to learn whether anything could be done to improve learning for policy making in a rapidly changing world" (Ibid., p. 9).

The Commission report is thus based on the observation, that "…the world faces unprecedented challenges and demands for new knowledge". And the report continues: "…knowledge is growing exponentially. The possibilities are boundless and exciting: in electronics and information technology; in biology and genetics; in materials science; in energy; even in social science.(…) The risks are real that new knowledge will increase world inequality and even deepen poverty" (Ibid., p. 13).

However, when it comes to outlining what the new vision may entail, the ambitions are dramatically reduced. Development research is about meeting development aid needs, reflecting the principles of Denmark's development policy, and every Danida funded research effort will in the future be expected to underpin and support Danish development aid needs, ensuring an improved aid performance.

This is further corroborated in the official presentation of the overall objective of providing development research as well as in the changes in the

Danish institutional development research and grant system, which has been introduced as a follow up on the recommendations made in the Commission report.

In the official presentation of the general objective of funding development research, it is stated:

"Support to development research and building of research capacity in developing countries follow the overall principles of Danish development aid. The purpose is, therefore, to contribute to fighting poverty through the building of new knowledge and capacity within relevant disciplines and areas. Development research is thus not an end in itself, but an instrument directed towards achieving the overall goals" (Research. Presentation of the Danish system of support for development research, the Ministry of Foreign Affairs' web site, 2005. Translation mine).

And in the same presentation it is stressed in presenting the role of the new RUF (the Council for Development Research), that it is the objective to "ensure a continuously high professional research quality standards and to strengthen the strategic and instrumental aspects of development research" (Ibid.).

However, within the reform measures introduced following the Commission report, the ENRECA concept for supporting research capacities in the developing world remains as an important vehicle.

The ENRECA concept

The ENRECA programme was the subject of an independent evaluation in 2000. The conclusion of the evaluation was that the programme was found very valuable and the evaluation strongly recommended its main principle of building capacities through twinning should be continued. The evaluation also made a number of recommendations, in particular that closer links between the programme and other Danida funded activities, including sector wide programmes, should be strengthened.

Also the Commission in its report finds that "ENRECA is an innovative programme, but is often not related to the aforementioned programmes (the other Danida funded activities, my remark) and, on its own, is not a sufficient response to the urgent need to strengthen the research and innovation system in Denmark's partner countries" (The Commission Report, 2001, p. 19).

The Enhancement of Research Capacities in Developing Countries was established by Danida in 1989. It is for Danida a main form of assistance to

research and tertiary educational institutions, carrying with is a funding of close to DKK 60 million for nearly 50 different projects, most of which located in a partnership constellation within Danida's so-called programme countries, and most of which in Africa. The programme includes a widely scattered fields and themes, however projects within health and agriculture being the dominant ones. Typically, an ENRECA programme is expected to have a duration of around 12 years, to ensure sustainability of activities, divided into three four year phases, running with a budget of around DKK 1.5 million per year.

It is the ambition through this partnership, or twinning arrangement, between Danish research institutions and research institutions in the developing world to provide assistance to capacity building at institutional and individual levels. However important the activity is within Danida's overall assistance to research[19], yet it is a very marginal activity within the overall Danida portfolio.

When the ENRECA programme was conceived, only few at that time discussed the process of globalization or the challenges which this process would pose for the knowledge based economy. In that light, it is obviously not fair to compare the programme, its status, function and outcome to the requirements and challenges of a globalized economy, in which the developing countries with few exceptions generally do not yet take part, yet it is not entirely beyond the point to address this issue seen on the background of the lofty goals and introductory justifications in the Commission Report, quoted above.

But it should be stressed that the ENRECA programme was seen as an instrumental effort in its own right to improve on quality of research and building research capacities as measured by own standards. Still it would also be an additional advantage if such capacity building could assist in ensuring better performance in Danida assisted programmes, although this was not a sine qua non.

The challenge for an ENRECA programme in an African context is no small task. Although highly varying, existing research infrastructure and capabilities are extremely weak, with a tendency also of reflecting different priorities and traditions of the former colonial powers. For instance, assisting primary, secondary, even tertiary, education was a much more given form of policy in former British colonies than it was in former French colonies (where the elite was educated in France at French universities), as reflected in better educational infrastructure established in both Ghana, Nigeria, Kenya, Uganda and Tanzania[20].

To an extent, the situation with regard to teaching and research in Africa also reflects the often more generally made observation that the African continent is on the margins of most things. The optimism and the dramatic growth processes witnessed in South East and South Asia are a far cry from what is seen in Africa. In this context, a main problem seems to be how to avert further marginalization, socio-economic differentiation and global inequities, with Africa still representing the continent so difficult to identify on the bandwagon of growth and prosperity.

Among the pertinent questions to pose could be: How to support capacity building that will assist Africa jumping on the bandwagon? Should some of Danida's aid priorities be redirected also towards the tertiary educational sector (at present only given priority to primary education, by means of sector programmes in selected programme countries)? And is an ENRECA programme an adequate remedy or instrument to be a factor within this challenge?

Assessing the experience from an ENRECA project in Burkina Faso

Burkina Faso belongs to one of the poorest countries in the world, according to both the World Bank World Development Report and the UNDP Human Development Report. The country is landlocked and heavily dependent on its natural resources for the survival of its inhabitants, most of whom live in a rural setting. The country's productive resources are extremely limited, with cotton production together with mining as the most important ones. In addition, migrant work in the neighboring coastal nations, such as Cote d'Ivoire and Ghana, are providing vital remittances of cash back to the mainly rural families, ensuring a crucial injection of cash into an economy which is only integrated into the market economy to a limited extent. – Aid provides another vital means for assisting the government in running its investment programmes and ensuring a certain very basic provision of health, education and other social services, as only limited sources of state revenue are present.

The Burkinabe economy is thus highly fragile, and in addition extremely vulnerable to climate variability. Situated on the border of the most drought prone areas in Africa, the Sahel, output from the rural economy is fluctuating widely with rainfall patterns, where only rainfall well above a long-term average may secure the livelihood of its inhabitants, while in periods of weak

rainfall, even drought (which is a recurrent phenomenon), poverty and famine may prevail.

It is in part on this background that the current ENRECA project has been formulated, trying to address two main development issues (although at a modest scale, within the financial provisions of the project type): On the one hand, the need to strengthen research, teaching and training within multidisciplinary environmental research, supporting the university departments ability to identify main developmental problems related to environmental degradation within the rural economy, and study these with an intention to be able to address and propose more adequate and suitable solutions to degradation issues. On the other hand, the need to address a basic and more widespread problem in the country, namely that Burkina Faso has only limited human resources at its disposal, taught and trained and with formal degrees enabling them continuously and consistently to educate new cohorts of young graduates, who can further assist the country in its development efforts.

While the situation in Burkina Faso in nearly all aspects is very basic, the general university characteristics are not completely beyond comparison with many other universities in the Francophone area. To a certain extent, at least, it may thus be said that the experience derived from the Danida supported ENRECA project may not be out of tune with the situation characterizing other universities in Francophone West or Central Africa.

The two universities in the country – Universite de Ouagadougou and the Polytechnic University in Bobo Dioulasso – are established within a French academic tradition and have only been in existence for a relatively short span of years, the Polytechnic University in Bobo Dioulasso being the most recent one, established in 1994. Although the two universities in recent years have received support from a number of donors, the funding from government sources are very restrained, salaries to teachers, researchers and other staff are very low, in most cases forcing staff to supplement income from more than one job position or, for researcher and teachers, in doing consultancies[21], infrastructure provisions at the universities are very basic and the universities have only few among its teaching and research staff with doctoral degrees and employed at professorial levels. This also means that only few doctoral programmes exist, because such programmes require teaching and research staff with qualifications at doctoral/PhD levels. A consequence of this is that continuously, doctoral degrees are frequently sought abroad, in particular in France, the former colonial "mother" country.

The ENRECA project reviewed has tried to address some of the pertinent

issues identified above, in connection with the two partner institutes, the Department of Geography at the UFR/SH[22] at the University of Ouagadougou, and the Institut of Rural Development at the Polytechnic University at Bobo Dioulasso.

The project commenced in 1994 and has been running for two periods, and is now in its final, phasing out stage, ending as of end-2006. The total amount granted for the project by Danida has been in the tune of around DKK 13 million.

Within an overall objective of strengthening multidisciplinary research and education at the two institutions, the ENRECA project has more specifically targeted:

- The creation of a GIS (Geographic Information Systems) and Remote Sensing laboratory;
- The introduction of basic as well as more advanced courses in GIS and RS techniques, for students and teachers, trainers and researchers;
- The support to conducting field studies and field surveys for students preparing for their Diploma or Masters work;
- The holding of specialized courses on field work methodology, data treatment techniques, the use of netbased data and literature information; writing skills and (English) language training;
- The support for research conducted by research and teaching staff;
- The participation for research and teaching staff in relevant international conferences, particularly those held in the region;
- The holding at the University of Ouagadougou of regional conferences, presenting outcome of ENRECA supported research;
- The holding of workshops targeting policy decision makers and (Danida) aid personnel;
- The publication in refereed journals and other sources of publication of research results, following the French peer review-system CAMES;
- The jointly pursued research between Danish and Burkinabe partners;
- The support for PhD studies for selected Burkinabe researchers.

What have, then, been the achievements, as measured against the formulated expected outputs in the Project Document?

A fully equipped and functioning GIS and RS laboratory has been created and maintained, where more than 30 undergraduate students have been trained each semester in basic GIS techniques. In addition, advanced courses have regularly been offered to senior staff. Covering modest costs of doing field studies, collecting data for Diploma and Thesis work, has contributed to more than 40 students written projects, which generally have received higher than usual marks, and where candidates passed these examinations are high in demand on the Burkinabe labor market. Senior teachers and educators have been offered training in the new technical opportunities, which GIS, RS and other IT techniques provide, however only few responding to this. A substantial number of articles have been published in CAMES peer reviewed periodicals, increasing publication frequency compared to earlier. Still, quality of research has only improved slightly, which to an extent is related to a particular (perhaps French inspired) perception as to what research means, namely to conduct field work, being in the field for prolonged periods of time and to collect enormous amounts of empirical information and data, resulting in more descriptive rather than analytical forms of research. Two PhD. candidates are in the process of finalizing their dissertation work, being ready shortly for the defense. Only marginal collaboration on research has been seen between Burkinabe and Danish colleagues and only a couple of joint publications, none of which in peer reviewed journals.

The overall assessment is believed to be positive, as achievements seem to be at par with other ENRECA projects. Yet, these achievements may seem modest as compared to the funding gone into this kind of project and, in particular, the opportunities offered, which have not always been well received or welcomed.

The latter issue is touching upon a wider set of problems in partnership programmes, in which unequal partners participate, however based on the ideology of partnership, colleagueship and equality – which can only be assured in the very long term. And the more basic conditions at the outset, the more time is needed, perhaps in cases awaiting a whole generational shift, in attitude, motivation and career ambitions.

This seems at least to have been the case for this ENRECA project, where the baseline situation was more difficult than anticipated, and more problematic than an initial institutional assessment was able to reveal.

Immediately after the commencement of the project in 1994, the one partner institution, Institut de Developpement Rural, was transferred to the

newly created Universite Polytechnique in Bobo Dioulasso, and every staff had to move to the province and into a university, which barely existed as no infrastructure was then in place. Logistically this constrained collaboration and communication tremendously, resulting in the Universite Polytechnique never really getting into the project focus. But in addition to this, the two partner institutions proved to be far more weak than foreseen.

While this may seem to have offered excellent justifications for an ENRECA project type, providing assistance to university institutes in dire need of such assistance, the result however was a far more strenuous collaboration modus, a constant uphill battle, than anticipated. In addition, the project ambitions and the possibilities it offered were not always received with the expected understanding and approbation from, in particular, senior staff members. Rather to the contrary.

To senior staff members the expectations were that this project would provide a kind of social development fund, which could compensate for the otherwise low university salaries. While the project has included output based remuneration criteria, such paying premiums for publications accepted in peer reviewed journals, the project was not able to pay topping up of salaries (without functional duties attached to it) or cover per diems or travel claims in the order anticipated by colleagues. In general, the assumption of the project, that the opportunities offered would be viewed as intended, namely as an opportunity for strengthening career options also for senior staff, this was not exactly seen in the same way, as senior staff in cases did not show keen interests in improving their career prospects. Nor did they, in cases, seem to acknowledge and encourage that younger staff much more eagerly tried to explore the possibilities offered by the project.

One lesson from the project in this regard is that the generational problem is a serious one, and one which is particularly difficult to tackle. The younger generation has aspirations and ambitions, because to them knowledge means power – and improved likelihood of a change in living conditions. For the older generation, knowledge gained by the younger generation may mean loss of power, thus threatening a hierarchised and authority based stiff university system.

For the Danish project management team this implied a number of constant challenges, which were not always overcome in the most elegant fashion, if overcome at all. At times frustration on both sides resulted in open conflicts and threats of interrupting the project, mainly due to an activity level too low compared to work plans and agreed upon decisions, seldom sustained and

implemented. In this non-decisions were good, even better than decisions, as everything seemed always to be (re)negotiable. In many ways this was also a clash of cultures, which in short may be expressed in the form of French inspired culture (and language), mixed with Burkinabe laissez faire and confronted with Danish rationalities, including expectations as to meet more or less similar rationalities in the partnership constellation.

To sum up, however, trying to answer one of the questions posed initially, outcome from the project has not been negligible and largely results have met several of the output criteria listed. As such, the project has not been failing, perhaps also largely corresponding to results from other comparable ENRECA projects. Yet results may not have been that impressive compared to the costs, energies and time put into it and may have left partners slightly disappointed.

The ENRECA project as assessed in a national context

While the ENRECA project by and large has demonstrated that many of the outputs listed in the Project Document have been met, at least to a certain extent, still it may be questioned whether the project is sustainable in the longer term. This aspect has to do with both the way in which the partners and the partner institutions view the project now and beyond the formal termination of the project towards the end of 2006, and the broader national conditions for sustaining an ENRECA kind of project activity.

As already touched upon in the above, the expectations of staff at partner institutions, in particular senior staff, were that the project would enable to make a contribution to the meager salaries paid within the university system, seeing the project more in line with a "social development fund" rather than as a vital career vehicle. This again lead to numerous discussions and conflicts over means and end in the project and surely did not encourage general motivation or levels of activity. As mentioned by a Director attached to one of the institutions when the heating turned on: "This is not the first project of its kind, and certainly will not be the last".

While these types of discussion left the project management in a role as controllers more than partners, and where the local management team continuously resisted playing its controlling and management role, the whole subject of discussion and controversy should be realized as a real one: No research capacities can be built, which will prove viable and sustainable, unless dedicated and motivated people are in place. Motivation and dedication,

however, in a developing world context cannot be separated from the basic fact that even university staff have to live, survive and sustain the livelihood of their families, and if government regulated (university) salary structures do not allow for that (while donor driven consultancy remuneration structures do), then any ENRECA project (in which topping up of salaries are prohibited by the very same donors paying excessive consultancy honoraria) is deemed to run into similar kinds of trouble experienced in the present project. University staff is no more philanthropists than any other salaried personnel!

In this Catch 22 situation, the ENRECA project failed to address a pertinent problem, which in the course of events took over as a main controversial issue, repeated again and again, constraining, even hindering, that outcome of project investments resulted in more convincing – and sustainable results. And to the extent results from the project will be sustained, in particular the GIS and RS laboratory, this is still expected to have an effect primarily within the university system itself, rather than beyond, although in this phasing out stage, in which the project currently is, exactly efforts in trying to market and sell the services and the courses offered by laboratory staff, are seen as a potential income generating device.

But the limitations put on a project of the ENRECA type, situated in a rather typical African context, with low remuneration and incentive structures and with the funding of universities not high on the government budget spending agenda (or given priority by donors generally), these are also the limitations which constrain this form of capacity building in fulfilling their more ideal functions, namely situating such form of assistance in a larger chain structure, reaching from institutes and departments, to university level, and further on to line ministries, addressing not only research per se, but also research policy issues, research administration and, not the least, research results utilization, to the benefit of society at large.

This is an ideal model, which has been discussed for years and on the background of which "good" research assistance to broadly based capacity building in the developing world is measured. Because in this thinking, assistance to building capacities in the "local space", at university levels, matters little, however valuable it may be seen, if not situated within and influencing the broader, nationally based research infrastructure, chain of management and decision making structures.

Within such a comparison, the ENRECA project in Burkina Faso has failed to live up to such broader national ambitions and objectives. Although the project has not been conceived of in this perspective, still the national macro-

economic limitations for both university funding and the maintenance of realistic remuneration and incentive structures for university salaried staff have prevented such broader national ambitions in being met while at the same time casting in doubt prospects for viability and sustainability at university/ departmental level itself.

Relations to other Danida funded aid activities

Another measure of relative success would have been if the support to capacity building at the two universities in Burkina Faso had resulted in a much more intimate working relationship with the Danida technical staff at the Danish Embassy in Ouagadougou or resulted in research results feeding directly into relevant Danida funded aid activities.

As may be recalled from the above, exactly this point seeing research capacity building as closely related to other Danida funded activities has been raised as a critical issue in the ENRECA evaluation from 2000, and reiterated as a very important element to remedy in the future, as mentioned in the Commission Report from 2001.

Certain efforts have been made on behalf of the ENRECA project in the course of its lifetime to establish better relations with both the Danish embassy and with Danida funded projects. A number of workshops have been held, presenting outcome of research, to which embassy staff has been invited, together with other stakeholders from both the aid and research community in Ouagadougou. The purpose of these workshops have been, as also reflected in titles of the workshops held, to try to build networks and relationships in order to bridge between research, aid and policy. In addition have ENRECA staff taken the initiative to meet with Danish mission staff, in particular with those professionally responsible for projects within rural development or natural resource management.

With regard to the Danida funded projects in relevant sectors, the ENRECA project has directly established through officially signed Memorandums of Understanding between project management and ENRECA researchers links which were expected to be reasonable committing and resulting in closer collaboration.

In general, such avenues for improved relations and efforts in having research to feed into the policy process have, however, shoved only limited success. The reasons for this may be many.

On the one hand, it may have been the case that the researchers have not been able to communicate effectively their messages, in forms suitable for policy making or project management. Also the researchers may have been reluctant in establishing more formal relations of collaboration in view of the stricter requirements for producing useful results within fixed periods and deadlines. And the researchers may have been viewed as less relevant and qualified to do the jobs requested, compared to others, for instance consultants or consultancy firms.

On the other hand, it seems obvious that on the "recipient" side, the situation is often characterized by excessive work loads and a time (as well as disbursement) squeeze which leave little room for afterthought and experience gathering. Awaiting responses from researchers who often deliver such with certain delays, or demanding more time to dig deeper into problems, which have shown far more complex than anticipated, may not be seen as facilitating collaboration and mutual trust. To this come a turnover in personnel at embassies and projects which in many cases require that efforts in establishing networks and partnerships need to start all over, when such relations have finally been established with some individuals, only to see them transferred to a new posting within a relatively limited time interval.

To conclude, with regard to establishing more synergies and improved, effective working relations between an ENRECA project and stakeholders within the aid, policy making or research community, the experience from Burkina Faso shows, that there is still considerable scope for improvements, and that the recommendations both of the 1990 ENRECA Evaluation and the remarks by the Commission Report in 2001 are still valid.

ENRECA projects: Building capacities to respond to global challenges?

The ENRECA project in Burkina Faso was formulated in the early 1990s and commenced its activities in 1994 at a time where globalization and the quest for feeding into a globalized knowledge economy were still issues which seemed to belong to the future, at least which did not take up as much place in current discussions and rhetoric as to-day. In retrospect, the ENRECA project in Burkina Faso may thus be termed an "ENRECA Classic" project. On this background it may seem ridiculous to try to assess the extent to which an

ENRECA project could play a role in such global challenges, even more so an ENRECA project in one of the world's poorest nations, Burkina Faso.

However, how far-fledged this may seem, still this is a perspective raised in the literature more generally, as a main justification for also this kind of capacity building project. Such views are reflected in the Commission Report quoted above and, for instance, when Thulstrup (1998, p. 90) in his introduction to an article states that "The rapid technological development of recent years has produced numerous research based products without which developing countries will be unable to compete in increasingly global markets. Technological progress has important positive aspects. In many cases the new technologies offer unique development opportunities for countries in the Third World".

Although the best performing part of the ENRECA project in Burkina Faso consists of the establishment of a well functioning GIS and RS laboratory, using some of the most recently available ecological monitoring technology at a scale useful for university teaching and research purposes, yet it is more than doubtful that this aspect of the project, at least at present, may contribute to Burkina Faso facing some of the challenges posed by an increasingly global economy. This is, however, closely connected to the capacity building project not yet forming part of a wider national capacity effort (as referred to above).

But it is also a result of a way of conceiving research assistance as centered around aid and aid needs, and seeing research strengthening and capacity building as instrumental in assisting aid projects becoming better performers, rather than seeing the support for research as having a value in itself, as contributing to a broader defined economic growth process.

Thulstrup (Ibid., p. 91) touches upon similar aspects, when saying that:

"Research in many developing countries (particularly in Africa) is donor driven. Consequently, the changing relevance of different research fields in a given country is not only of national interest: it is also important for donor agencies.

Many of the large donors still have a strong preference for research capacity building in tropical health, tropical agriculture, and development studies, often applauded by powerful donor country lobbies in the academic environments of these traditional fields. Today, however, it is increasingly clear that the needs for research capacity building in the Third World are much wider".

Building research capacities in a wider sense means addressing a much more fundamental, even imperative development issue, namely looking critically into prevailing, mainstream development strategies, which are nowadays supported

by the whole range of donor agencies, whether multilateral, bilateral, NGOs or any other donor variant, emphasizing the very same development priorities (and often with the very same approaches and means).

Needless to say, aid in support of poverty eradication, support to good governance, democratization, decentralization, empowerment, participation, etc. cannot, and should not, be basically changed, as seen also on the background of the tremendous efforts done by donors and recipient governments alike (and also results coming forward), but why all donors should overcrowd the middle field in a way as of present, seems less obvious and justified. And why support to research capacity building should be perceived of as mainly seen within the same light and scope, aiding aid to perform better, also seems less obvious.

The clear leaning in the Commission Report, and its subsequent adaptation in Danish research policy practice, may here be viewed with particular reservation, because research capacity building will never meet its fundamental societal goal, including building capacities for meeting the challenges of the global economy (not to talk about having a place herein), without seeing capacity building in a broader perspective, more delinked from the specific requirements of the aid sector itself than at present. Seeing research capacity building mainly as mirrored on the requirements of the aid sector seems to be a misleading perspective, at least viewed in a wider national and international perspective.

And instead of mainstreaming all aid towards the common objectives, as set forth in the Millenium Development Goals to be reached by 2015 (however laudable this effort is), a greater variability and experimentation may be warranted, where the economic growth imperative be brought back in. No knowledge based economies may see the light of the day unless economic growth broadly speaking (not only "pro-poor growth") is (re)introduced, the material productive fundament on which economic sectors develop, creating inter-sectoral linkages through effective demand in one sector for the trade and services in another, creating work places and employment, in domestic as well as export sectors, salaries, demand for consumer goods and taxable incomes with which, eventually, a state revenue can be gained, affording salaries paid based on which families can live and strive, etc., etc. Although this may also be the stated end-goal of much aid programmes, yet the focus is at present not on how best to create dynamic economic growth processes.

For research capacity building to be effective, in support of countries overall growth potential, rather than only assisting aid in becoming better, there seems to be a need for getting beyond poverty reduction per se, in combining efforts

in reducing poverty with a fundamentally new drive towards more dynamic and qualitative economic growth processes.

Conclusion

In responding to the four initially posed questions, it may be concluded that in reviewing the ENRECA project in Burkina Faso, many of the objectives set forth have been met, to a certain degree, at least. On this basis, and as compared with other ENRECA projects, outcome of efforts is not insignificant.

At the same has the review shown a number of constraints and difficulties that may be typical for other ENRECA projects as well, which are closely linked to differences in perception of the project, its objectives, ambitions and working modalities. The perceptions of these issues differ widely between partners and tend to create constant problems. Such differences are in particular fostered by prevailing meagre remuneration and incentive structures at universities in the developing world, that make it difficult for research and teaching staff to sustain a decent living. Instead, externally funded research capacity building programmes are often seen as a source of supplementary income generation, rather than – as assumed in the project logic – as a means of improving academic career opportunities.

The assessment above has also shown that the ENRECA project has had limited impact in supporting national research capacity building efforts, although a potential exists within the established GIS and RS laboratory and its technological and human resource means.

While much of the justification for an ENRECA support type of activity is linked to aid practice, in this case linked to Danida funded aid programmes in Burkina Faso, also this aspect has not been faring in a particularly impressive way.

Finally, the ENRECA project has not succeeded in making Burkina Faso able to better respond to the challenges of a global knowledge economy which, however, may also be seen as far out, as this was not targeted in the original conceptualization of the ENRECA project, which may be termed "classic". Yet, also this aspect ought to be included when formulating new, future research capacity building projects, whether in the form of a modified ENRECA type project, or in inventing completely new forms of assistance.

Thulstrup (1996) is suggesting the following levels, or stages, in a research capacity building effort, reaching from the more basic, partial capacity building

within a given field, to a broader national capacity building outcome, seen as the ideal end-goal of research capacity building efforts:

- Partial research capacity in a given field is reached when researchers in that field are able to carry out research at the international level in cooperation with experienced researchers elsewhere;
- Complete research capacity in a given field is reached when researchers are able to perform all aspects of research and related training in the field, from the planning process to the dissemination of results at the international level;
- National research capacity is reached when a country is able to prioritize research activities; to effectively provide support for selected research projects; to monitor and evaluate research; to train, attract, and keep good researchers in the country; to create conducive research environments; and to apply research outcomes – both in the form of research training and results – for national development.

Seen on this background, the ENRECA research capacity building project in Burkina Faso can be seen as having contributed to the first two items, and probably more to the first one rather than the second one, while the third aspect is largely untouched by the project. In this connection it may also be said, that there is quite a quantum leap between the first two and the third ambition/objective. Indeed, a leap which seems rather far away in a distant future for a country such as Burkina Faso, where everything continuously is very basic.

However, the assessment of the ENRECA project in Burkina Faso has, perhaps, also raised the issue as to whether the ENRECA concept is an appropriate, adequate and timely tool for meeting the variety of goals, which present day developing countries are facing. The ENRECA concept may assist in building capacities in a particular field, and may do this very well. And the ENRECA concept, particularly in view of the implementation of the recommendations of the Commission Report, may also be an adequate tool for building capacities that may help Danida funded aid projects and programmes perform better.

But in meeting the broader issues associated the challenges of globalization or assisting developing countries (particularly in Africa) in having a place within this global economy, the ENRECA concept clearly falls short of

expectations. In this respect there is need for new innovative thinking, and there is a need for new concepts and new modalities of assistance.

Such new thinking may take on two forms: On the one hand, the currently applied ENRECA concept should be reviewed and perhaps modified in order to ensure that not only (Danish) aid requirements for improved performance are met, but also that the *national* research capacity building effort is much more highlighted and prioritized. Indeed, the latter ought to be the primary objective to pursue.

On the other hand, there is obviously a need for revising aid strategies aimed at improving countries in the developing world in being better able to respond to the challenges of the global knowledge economy, and assist them in seeking a place within this perspective of globalization. This may be reached through aid, through supporting the countries role in WTO negotiations, in trade and export orientation. But it may also be needed more specifically and directly to target *high quality, technologically advanced research and tertiary education in general*.

At present, a few educational sector programmes are being developed (or at their start of implementation) for Danida assistance, but only targeting primary education because this is seen as directly connected to the main goal in Danish assistance of poverty eradication.

But there is a need to see research and education in more holistic terms, also including the wider and still more compelling development issues.

Recognising that it is not possible (even warranted) to redirect completely Danish aid practice and strategies, nor to expect that Danida can take on each and every challenge the developing world is facing to-day, focus ought to shift towards the Danish Ministry of Science, Technology and Development, which is conspicuously absent in this discussion. Although the Ministry may be seem to be a natural partner, perhaps together with Danida with its profound knowledge of and experience from working in the developing countries, there is no indication that the Ministry wishes to play a proactive and effective role in this field.

Despite Government proclamations about wishing to see Denmark on top of a globalized world, at the forefront of international competition due to our swift responses to the challenges of the global knowledge economy, yet this has not been followed by corresponding strategic developments or funding possibilities. And neither has it been followed by the Ministry of Science, Technology and Development formulating how they may perceive assistance to tertiary education and partnership building between knowledge centres in

Denmark and abroad (including countries in the developing world) may assist also Denmark in fulfilling the role, the Government says it wishes to see.

There is, obviously, a dire need for a new strategic turn, followed by concrete initiatives and activities.

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Notes

19 In 2000, the Danida outlay for research amounted to a total of DKK 318 million, of which the contribution to the international CGIAR system amounted to DKK 130 million, the Council for Development Research DKK 49 miillion and contributions to centres and networks a total of DKK 80 million.

20 As an indication of this, Ghana had its first Secondary School built in 1917 in Achimota, feeding into the University of Ghana, Legon (located a kilometer away) constructed as an independence gift from Britain ahead of the formal Independence in 1957.

21 Often such consultancies are paid for by donors, including Danida, at rates which compared to salaries received at the university, may seem excessive, generally disrupting, or at least making it very difficult to maintain an ambition about creating sustainability through full time staff, working full time, fully devoted as well as fully remunerated, at least to an extent where a decent living is ensured.

22 UFR/SH, meaning Unite Formation Recherche/Sciences Humaines, is the organizational form under which former institutes/departments are grouped after a university reform in 2000.

Globalisation of Tertiary Education and Research in Developing Countries – The Malaysian-Danish Experience

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Abstract

In 2000, the Danish Cooperation for Environment and Development (DANCED) funded a capacity building project at Malaysian universities in environmental management and sustainable development as a second phase of an earlier effort to develop the resource base of Danish universities in assisting developing countries manage their environmental needs. Fifteen academic staff were exposed to education and research in Denmark and over 60 staff participated in various workshops on pedagogical approaches and in technical areas organized with the assistance of Danish universities. Twelve course modules utilizing problem-based methodologies were collaboratively developed among Malaysian universities. These modules, with the extensive use of 38 case studies, have been successfully integrated within numerous master and undergraduate programmes on environmental management and technology. Eighteen joint research projects were funded to support case studies development. Thirty-nine postgraduate students experienced problem-based learning in real-life projects during three joint courses that were organized with students and faculty members from Denmark. These students gained intercultural knowledge and were exposed to Danish teaching methodologies. The courses received enthusiastic response and subsequently two more courses were organized after the project ended. External stakeholders, as

the end-user of university graduates, participated in the planning process for course module development and in other project activities whereby they have built their own capacities and a closer relationship with universities has been developed. DANCED's support framework has also included universities in southern Africa and Thailand. Under this umbrella, a linked network was developed between the 19 universities to support education and research initiatives. Seven research networks were established and now link researchers from these four countries. In 2002, Malaysian academics gained the opportunity of contributing towards a joint declaration on higher education in sustainable development, which was presented at the World Summit for Sustainable Development in Johannesburg. Overall, a steady exchange of knowledge and experiences in environmental management was achieved. Malaysian universities have developed better capacity, intra and inter-institutional frameworks for collaborative teaching and research, and mutually recognize each other's strengths. The relationship with Danish universities is now sustained under new phases of co-operation under projects funded by the European Union and also through other initiatives. From the Malaysian perspective the programme is considered a success in bringing a paradigm shift in teaching methodologies. It has created numerous linkages for career development and a scientific collaboration in research.

Introduction

Demands for tertiary education are increasing in view of the changing social and economic structure in many developing countries including Malaysia. A knowledge-based economy is envisioned as a goal towards achieving a developed nation status and a more competitive economy with less reliance on the industrial and agricultural sectors. With the globalisation of economies, opening of new markets and a higher presence of multinational organisations in many Asian countries, both employer and employee demands for higher qualifications are being experienced. Universities have traditionally played the role of providers of education and although this function remains the same today, graduates have greater expectations for the type of postgraduate education being offered. Universities have acknowledged the need to re-orient their education policies and enhance their capacity not only in re-training academia and in increasing the quality of programmes through the application of new methodologies, techniques and knowledge but also in utilising available

tools in information technology and communication. In view of this, the globalisation of education can be seen as a strategy in response to these needs. Globalisation of universities means a growing interdependence and interconnectedness of the globe through increased movement of students and academics across boundaries with the lowering of barriers for their movements and better international communication (Verma, 2004). In a developing country, globalisation of education offers the opportunity of shared access to resources and can encourage the transfer of technology, innovative techniques and methodologies. Overall, this will help fill the gaps in knowledge and increase the capacity of education programmes at institutions within these countries. This paper aims to present some experiences, achievements and lessons learnt from working within an international collaboration aimed at developing the capacity of Malaysian tertiary education. It also poses some challenges for future collaborative activities between institutions especially from developing and developed countries. The Malaysian-Danish collaboration under the Danish Co-operation for Environment and Development (DANCED) programme is used as a case study.

Background

A specific economic framework for financing Danish environmental assistance began as a follow-up to agreed commitments at the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992 to assist developing countries in environmental development. A facility for assistance was established in 1993 and the total budget for this facility was expected to reach 0.5 per cent of the GNP by 2005. In 1999, DKK 3.2 billion was allocated and administered under three units: Danish Co-operation for Environment in the Arctic (DANCEA), Danish Co-operation for Environment and Development (DANCED) and Danish Co-operation for Environment in Eastern Europe (DANCEE). The strategy for environmental assistance for developing countries was developed under DANCED and targeted Danish Environmental Assistance (DEA) countries in Southeast Asia (Malaysia and Thailand) and Southern Africa (Botswana, Lesotho, Namibia, South Africa and Swaziland).

In 1998, DANCED provided support to a Danish consortium of universities to undertake a programme to strengthen their resource base for integrating environmental consideration in development planning and facilitating

environmental assistance activities targeted at DEA countries by improving and supplementing on-going research activities. The pilot phase of this programme involved the development of relevant and extended curricula at Danish universities to support the traineeship of Danish students at DEA countries and was enhanced by activities such as educational conferences, continued education and increased mobility of students and faculty members.

As the Danish consortium of universities concluded its pilot phase and entered into the consolidation phase, DANCED provided financing to support similar university consortiums in Malaysia, Southern Africa and Thailand. These three university consortiums were established at the end of 2000 and subscribed to similar goals in building the capacity of academic staff and students and developing a resource base in environmental management and sustainable development with more specific targets corresponding to priority areas within the respective countries. The consolidation phase of the Danish consortium of universities was geared towards working in collaboration with these newly established consortiums to support their respective programmes.

The Malaysian-Danish experience

The Malaysian consortium of universities was established in August 2000 and comprised of four public universities: University of Malaya, Universiti Kebangsaan Malaysia, Universiti Putra Malaysia and Universiti Teknologi Malaysia. The objective of the programme was to improve the capacity of master programmes at these universities by developing interdisciplinary and problem-oriented course modules utilising case studies in the field of environmental management and technology. The project drew upon the resources available at the Danish consortium of universities primarily Aalborg University, Roskilde University and the Technical University of Denmark. The main activity under the programme was the collaborative development of twelve masters' level course modules, which was supported by staff exchange and training programmes, collaborative research activities and interaction with stakeholders. The project was concluded in September 2003 after a 10-month extension period. Some of the main activities in relation to this capacity building experience are described below (MUCED, 2003).

Curriculum development

The core output of the project was the development of course modules based on problem-oriented approaches, which are now being used within masters' level environmental programmes at the four universities. Twelve common course modules were developed collaboratively between academics from these institutions through a joint effort to utilise resources and expertise available at the respective institutions. The course and case development process was conducted through a series of workshops throughout the project period as well as on an individual team level basis where the course outline was defined and assigned to various team members. Teams consisted of between two to five members from the four local universities.

Relevant material were sourced through the numerous initiatives (study visits to Danish universities, the training workshop series, and the research components) and used within the modules. The physical process of collaborative work with Danish academics was however limited. This can be partly explained by the difficulties in coordinating such a work process between academics from different institutions in different parts of the world. Better information technology and communication tools may play an important role in enhancing the process of knowledge transfer. Malaysian academics were exposed to problem-based methodologies but there was a resistance to step out of "traditional" teaching methodologies. There are still institutional constraints in fully practicing problem-based approaches.

In general, the development of course modules that are collaboratively designed and developed can play an important role in providing curricula an international outlook as well as raising the overall quality, as these modules would be subjected to the educational requirements of all the institutions involved. However, defining commons goals in curriculum development between international institutions can be difficult due to a variety of reasons. For example, the socio-economic environment plays an important role in defining the direction of the national and institutional educational policy in a country and there can be very obvious differences between these needs in developing and developed countries. Similarly, institutions, even within the same country, have programmes that vary in structure, academic objectives and research priorities.

Study visits

Study visits are an integral component in developing collaborative frameworks between institutions in the transfer of knowledge and expertise. These visits can vary depending on the objectives of the visit and the overall scope of a programme. In the context of capacity development at institutions of higher education, some common goals are to explore areas for collaboration, new techniques and methodologies, and establish physical linkages between institutions where training and development can occur. Under this framework, 15 senior academic staff conducted two-week study visits that were aimed at gaining exposure in problem-oriented methodologies in teaching and learning, collecting relevant course material and developing potential areas of research collaboration with Danish counterparts. This was generally achieved although the objective to conduct co-teaching to provide the Malaysian academics hands-on experience in problem-based learning was not possible for all visiting academics. These visits were often shorter in duration than initially planned however obtaining good scheduling between academics and host universities can be a problem due to a variety of reasons which includes variations in semester dates and other schedules. An optimum visit must nevertheless satisfy a sufficient duration of time to achieve the objectives set out and fall within the constraints of available funding.

Prior to visits, sufficient time needs to be allocated for planning and developing the visits between both parties. Although, generally this happens, more scrutiny needs to be put on this to ensure a successful visit. An important part of the experience when visiting a foreign institution comes from intercultural exchanges. This is an important factor when the aim is to integrate foreign curriculum in local programmes. The point of departure in doing this successfully stems from being able to recognise differences in teaching and learning cultures and adapting them accordingly within local programmes and standards.

Training workshops

The training component of the project was developed to support capacity development of the academic staff at the universities. It was primarily aimed at providing hands-on training and academic resources for the course development process both on methodological approaches in teaching and

learning, and specific areas of focus on environmental management and technology. Workshops were conducted on problem-based learning, teaching methodologies, and module writing specifically to assist team members in preparing their modules. In addition, short courses and workshops were organised with the participation of resource personnel from the Danish universities in the areas of Environmental Economics, Environmental Ethics, Environmental Impact Assessment, Environmental Modeling, Occupational Safety & Health, Solid Waste Management, Water Recycling & Reuse, and Water Treatment Processes. Over 60 academic staff from various Malaysian universities participated in this programme.

In general, these workshops facilitated an active exchange of information among local academics and Danish resource personnel in understanding the problems and constraints in a local context, comparing differences of these scenarios with that in Denmark and exploring new ideas and methodologies. As part of the project objectives, the participation of stakeholders were continually encouraged and these workshops were well attended by representatives from numerous research bodies, government institutions, industries, non-governmental bodies, community-based organisations etc. This also provided a valuable experience for local academics and initiated a multi-level stakeholder dialogue, which is recognised as an essential process of solving environmental problems. External stakeholders, especially non-governmental bodies and community-based organisations gained an opportunity to build their own capacities and a closer relationship with the universities was developed.

Overall, these workshops provided an excellent ground for capacity development and are an efficient solution in training a large number of personnel. By developing a relevant training programme, based on specific objectives, the collaboration with international trainers and resource personnel can effectively support international development of curricula and in research. These programmes can be more effective if they can be integrated within existing training programmes on long-term basis.

Research activities

Within the project, research activities were conducted to support the course development component particularly to establish case studies for the twelve course modules. Funding for research was limited, however existing research funding available within the Malaysian universities complemented overall

research activities. A total of 29 local case studies were developed for these modules by local academics and 18 joint research projects were established. Only limited input on this was gained from Danish academics particularly due to limited funding available to establish joint projects, time constraints and scheduling to develop and coordinate these projects, and the overall focus of the project objectives and activities which was different between consortiums.

Collaboration between the consortiums was gradually developed and supported research networks between Malaysian and Danish academics as well as academics from the other consortium universities in Botswana, South Africa and Thailand. Seven research networks were established within the project period as follows, and represented the participation of 19 universities:

i. Critical Comparative Environmental Impact Assessment
ii. Environmental Management Perspectives
iii. Public Participation in Environmental Projects
iv. Chemical Assessment of the Environment
v. Management of Resources in Urban Areas and Industries, Focus on Nutrient Recycling
vi. Water Resource Management
vii. Energy Planning and Technological Development

These networks were aimed at supporting an active discussion between academics from the different countries in exploring research areas and methodologies, and applying these outputs to provide continued support to curricula and course development. These networks have in general have applied two different approaches: the "integrated activity approach" where research objectives are explored through many different approaches and the "comparative study approach" where the focus is on comparing similar case studies from different countries (LUCED-I&UA, 2004). Joint projects were carried out through the funding of master and doctoral students from Danish universities at the partner consortium countries. Due to funding limitations, reciprocal exchanges by Malaysian students to Danish universities have not been possible, however this will remain an area of opportunity for the future.

Although, the overall impact and extent of these networks is difficult to evaluate, it was generally felt that collaborative research experienced by Malaysian academics help promote the development of new research areas as well as new approaches, techniques and methodologies in local research projects. There has been a continued exchange of information and knowledge between

these academics, which has contributed towards building the capacity and quality of academic programmes in Malaysia. As a result of these collaborative networks, at least 21 joint research papers between Malaysian and Danish academics have been published in international journals and proceedings from 2001 to mid-2004. The seven networks were in various stages of development at the end of the project periods and initial efforts have been geared towards strengthening and expanding the collaboration and sourcing for funding to sustain the networks. A critical factor that initially hampered this was a lack of coordination of research activities within the project documents of the various consortiums and lack of allocated funding for this purpose. Overall, funding will nevertheless be seen as a major obstacle to collaborative research in developing countries unless there is better coordination of activities between institutions, commitment towards collaborative research funding is institutionalised and a culture for collaborative research is developed.

Joint field courses

Joint field courses are intensive three-week problem-based courses that are developed collaboratively between Danish and Malaysian academicians. Three joint field courses were organised from 2002 to 2004 in Malaysia on themes ranging from public participation to environmental planning, management and regulation. About 25 to 30 postgraduate students from Danish and Malaysian institutions participate in each course, which consist of one-week of lectures supplemented with field trips and two-week group project work. In total 39 students from Malaysian universities participated in these courses. Joint field courses are a means to introduce innovative teaching techniques, inter-disciplinary and problem-oriented approaches, and intercultural learning both for students and educators from these countries (Wangel *et al.*, 2003).

The planning process for developing and implementing joint courses is an important element in organising a successful course. Course material needs to be developed collaboratively as individual academicians or institutions may have different expectations for their students. In this respect, curriculum will also need to cater to both student target groups, as different educational cultures (Wangel et al., 2003) can become very apparent when students come from a variety of educational backgrounds and nationalities. To level the playing field, introductory courses on local culture and socio-economy, intercultural learning, field research techniques and methodologies etc. play an

important role in preparing students for group project work on real-life case studies within a foreign setting. Language is often a barrier to intercultural learning and this is also evident for group project work where communication between students becomes essential (Bregnhøj, 2003). However, this was not a very apparent factor in Malaysia as students from Denmark and Malaysia have sufficient command of the English language.

Overall joint field courses were a useful and unique experience for student and academic staff development. The pedagogical approach of working on real-life problems is a challenging and rewarding learning process that was previously not experienced by Malaysian students and academicians. In addition, intercultural exchanges between participants often go beyond the classroom, which itself is an invaluable learning experience. The exposure of Malaysian educators to innovative teaching and field research methodologies play an important role in building the academic capacity of local institutions on an international level. As a result, two more courses were organized.

To sustain a working programme, joint field courses need to be integrated within normal study programmes at participating universities. This would further entail allocating sufficient credit hours and schedules as semester dates vary greatly at different universities. Universities also need to develop sufficient funding and resources, internally or externally, to support and strengthen these collaborative frameworks. Host universities also play an important role in building relationships with external stakeholders i.e. research bodies, government institutions, industries, non-governmental bodies, community-based organisations etc. to support curriculum and student project work process.

Traineeship and field studies (TFS) programme

The Traineeship and Field Studies (TFS) programme was one of the main activities of the Danish consortium of universities during its pilot and consolidation phase. The aim was to train Danish students in interdisciplinary and problem-oriented project work through field studies in one of the partner consortium countries. Both a local and Danish supervisor supervised students during their three to six month stay where students experienced working on real-life problems within the social and cultural limitations of a developing country. A total of 56 students from Danish universities completed projects in Malaysia from late 1999 to mid-2004.

The TFS programme had its greatest impact on the students themselves. The experience has been enriching in terms of developing intercultural skills, hands-on experience in the area of study and increasing new knowledge. On the local side, the co-supervision of students has facilitated a physical exchange of dialogue and knowledge between the local and Danish supervisors. This can be translated into joint publications, development of new collaborative research projects and networks, as well future student supervision.

The co-supervision of TFS students exposed local supervisors to new concepts and ideas that have developed into teaching and research projects (DUCED-I&UA, 2004). This has been a two-way learning experience for both students and supervisors. Malaysian supervisors gain from experiencing how these students work which may be very different from that of local students especially in problem-based approaches and qualitative research methods. This provides a greater insight not only on how to develop new and interesting projects but also on specific techniques that are being applied. TFS students also interact at varying levels with local students where similar exchanges as well as cultural occur.

A linked university network

As an extension to the project activities of the four university consortiums in Denmark, Malaysia, Southern Africa and Thailand, a linked university network, LUCED-I&UA (Linked University Consortium for Environment and Development – Industry and Urban Areas) was developed in 2000 with the aim of coordinating mutually benefiting activities among all consortiums by prescribing common goals in education and research and intensifying collaborative frameworks. In August 2000, the first conference was held in Kwazulu-Natal, South Africa in preparation of project implementation of the four consortiums. As a resolution to this conference, agreements were reached on the scope and direction of the education and research programmes i.e. staff and student exchanges, inter-disciplinary education programmes, collaborative research networks, and stakeholder participation. Subsequently, in December 2000, a workshop on research, education and planning was held in Copenhagen, Denmark as a further discussion on these items. The seven research networks that have been discussed above are a result of this as well as the frameworks for communication and collaboration between institutions.

A noteworthy achievement of the linked university network was the preparation of a joint declaration on higher education and research for sustainable development, which was presented at the United Nations World Summit on Sustainable Development in Johannesburg in 2002. This was a unique opportunity for the linked university consortium to showcase the experiences of partnerships in education and research capacity building for sustainable development. A pre-summit conference was held in Kasane, Botswana in preparation of this declaration and other outputs including a publication titled "Beyond the Summit: The Role of Universities in the Search for Sustainable Futures" and a video on "Problem-Based Learning: Critical Teaching for Sustainable Development" which highlights how universities can contribute towards sustainable development.

As a climax to the projects, an international conference in Environmental Management & Technology was held in Kuala Lumpur, Malaysia in August 2003. The aim of this conference was to collate and disseminate the wealth of experience gained through collaborative research networks and funded projects as a step towards strengthening and sustaining collaboration within the linked university network and all other relevant stakeholders. A total of 152 delegates from Botswana, Denmark, Malaysia, Thailand and South Africa attended this conference. Ninety-two papers were presented at the conference and a total of 28 of these papers were subsequently published in the Malaysian Journal of Science.

Project impact

This programme encapsulated a unique working model of inter-institutional cooperation in developing appropriate strategies in enhancing curriculum and the capacity of academics and postgraduate students through staff exchanges, training programmes and research networks at the Malaysian universities. Although it is difficult to quantify the overall impact of the programme especially in problem-based methodologies, this pilot programme serves an important learning experience for a large number of academics at the universities in collaborative networks of educational and research within an international setting. A rich exchange of different intercultural approaches and knowledge has taken place as well as a better understanding of the different needs and requirements of each country. These experiences are an important aspect of bridging tertiary education between Malaysia and

Denmark and ultimately will lead to better opportunities for cooperation and the internationalisation of academic programmes.

As a result of this collaboration, prior to the end of the project period, two projects under the European Union's Asia Information Technology and Communication (Asia IT&C) and Asian University Network Programme (AUNP) were commissioned involving Danish and Malaysian universities. The first on "Virtual Open-Access Network for Education & Training" between partners in Spain and Thailand and the second on "Water-Based Cities" with partners in Thailand. In addition to this, an Asia-Link project on "Problem-Oriented Project Based Learning in Environmental Management & Technology" with a new partner in Netherlands is expected to begin in mid-2005 and will be sustained till mid-2007.

Conclusion

In conclusion, the globalisation of tertiary education means recognition of cultural and socio-economic differences between institutions in different countries and regions. It is acknowledgement of what these differences mean in terms of the diverse resources available that can support the expansion of educational programmes. Universities in developing countries need to reorient their educational policies to build upon an international outlook in education and research priorities. The differences in funding capabilities between developing and developed countries will most often be a major barrier towards collaborative education and research unless external funds are sourced. The objectives for collaboration therefore need to be clear, transparent and should be mutually beneficial. Developing countries should not be used merely as training grounds for universities from developed countries or frontiers for new exploration for education, development or research purposes. There must be a commitment towards a shared responsibility for overcoming geographical boundaries in providing all students the ability to gain the best educational training available.

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Capacity Building for Higher Education in Developing Countries – A Part of the Western World University Portfolio?

by Stig Enemark, Professor, Aalborg University

Abstract

"Higher education is the modern world's basic education, but many countries are falling further and further behind". This quote from a recent World Bank publication indicates that the role of the universities as a key driver for societal development is now widely recognized and included in the donor policies. However, donor projects are not easy to organize in this area, and the role of the western universities in this area is not easy to identify.

The paper presents a case study from Mozambique dealing with a World Bank project in Higher Education. The project was focused on qualitative reforms in the teaching and learning process in selected faculties at three public universities in Mozambique. The objective was to increase the use of student centered, project-oriented approaches, integrated with computer use, and to provide measurable increase in the proportion of students that pass rather than fail the course.

A pilot project was carried out by a Danish university consortium with the purpose of developing a full scale project to be agreed and implemented as a part of the total World Bank project. However, in spite of the fact that the project was very well received and agreed by all parties, the funding problem was never solved due to a lack of cooperation and mutual understanding between the key stakeholders in both donor and recipient countries.

The paper presents the lessons learnt in this regard. There is a need to develop a cross-sectoral understanding at national level in the donor countries in order to merge the interests of the universities, the Ministry of Science/ Education and the national/international donor agencies.

It is argued that capacity building for higher education in developing countries should be a generally accepted part of the university strategy portfolio and be supported by the relevant stakeholders such as donor agencies, ministries and the trade and industries. It is important that such capacity building activities are seen as not only a key driver for societal development in the recipient countries, but also as a necessity for facilitating the building of relevant international capacity and institutional innovation in the donor countries. It is a process of mutual benefit for both recipient and donor countries.

Introduction

Higher education is increasingly seen as a priority in the policies of aid agencies such as the World Bank. It is increasingly understood that "Higher education is the modern world's basic education, but many countries are falling further and further behind" and it is understood that "Higher education is no longer a luxury, it is essential for survival" (World Bank, 2000).

The world's economy is changing as knowledge supplants physical capital as a source of present and future wealth. As knowledge becomes more important, so does higher education. Therefore, the quality of knowledge generated through higher education institutions, and its availability to the wider economy, is becoming increasingly critical to national competitiveness.

This poses a serious challenge to the developing world. Since many decades, most national governments and international donors have focused on primary education as a means to attain the goal of poverty reduction, while investments in higher education were considered to be less important and less beneficial to promote development. As a result, higher education systems in developing countries are under great strain.

It is argued that urgent action to expand the quantity and improve the quality of higher education in developing countries should be a top development priority. The strengths of all players, public and private, must be used, with the international community at last emerging to provide strong and coordinated support and leadership in this critical area. (World Bank, 2000).

This paper provides an insight into the needs for implementing this new agenda. The paper presents a case study from Mozambique dealing with a World Bank project in Higher Education. A pilot project was carried out by a Danish university consortium with the purpose of developing a full scale project to be agreed and implemented as a part of the total World Bank project. The case study shows that such donor projects are not easy to organize, and the role of the western world universities within such projects is not easy to identify.

Capacity building for Higher Education in Developing Countries is a complex area. It is a an on-going process that must be based on a national priority and a holistic historical analysis of the national system of higher education and its contribution to social, economic and political development. The analysis should establish clear goals and offer the ability to balance strategic direction by viewing the higher education system as a whole, determining what each part can contribute to the public good.

The role of the western universities is to facilitate this process of capacity building. This must be driven by strategic policy approaches and not solely through market driven consultancy activities. Capacity building in higher education is a two-way activity that must be seen as a necessity also in the developed countries. This calls for combined efforts of organizing the policies and priorities in both donor and recipient countries.

Case study: Mozambique

Mozambique gained its independency (from Portugal) in 1975. From the 80´s onwards, Mozambique faced a long period of economic crises, political and military instability and a civil war that ended in 1992 followed by the country's first multiparty election in 1994.

Mozambique is located along the south-eastern coast of Africa with an area of around 800,000 sq km. It is bordered to the north by Tanzania, to the north-west by Malawi and Zambia, to the west by Zimbabwe and to the south-west and south by Swaziland and South Africa. To the east, the country is bordered by the Indian Ocean, with a coastline of almost 3,000 km.

Administratively, Mozambique is divided into 10 provinces. The capital city, Maputo, has a dominant position in terms of economic and educational conditions, and for that it also has the statute of a province. Maputo has about 1 million inhabitants while the total population in Mozambique is 16.5 million

of which about 50 per cent is under 15 years. Portuguese is the official language even if it is the mother tongue of less then 2 per cent of the population.

At the end of 1992, Mozambique was classified the poorest country in the world. In the second half of the 1990´s, however, it has achieved one of the fastest rates of economic growth that has exceeded 10 per cent per year. Still, Mozambique remains an extremely poor country with an average per capita GDP of about 220 USD, and with about 70 per cent of the population living below the poverty line. The country is heavily reliant on external development assistance that in recent years has represented about 40 per cent of the total annual Government budget (Republic of Mozambique, 2000).

Higher education in Mozambique

The higher education system reflects the country's history. At first there was only one university, established 1962 and offering courses modeled on the Portuguese system. In 1976 it was renamed into Eduardo Mondlane University (UEM) having Doctor Eduardo Mondlane as patron in honor of his multifaceted stature of nationalist, political leader and academician. During the civil war coverage remained limited. After the peace agreement 1992 UEM remained the main provider of higher education. In 1985 the Pedagogic Higher Institute was created out of the Faculty of Education at UEM as a response to the needs of raising the entry level of the students. In 1995 it was renamed the Pedagogic University (UP). There are currently ten Higher Education

Institutions (HEI´s) in Mozambique as shown in the table below. The average ratio of students to full-time equivalent staff is about ten.

Name of institution Location	Year establ.	No of Courses	No of Students
Public			
Eduardo Mondlane University (UEM) Maputo	1962	22	6,800
Pedagogic University (UP), Maputo + branches in Sofala and Nampula	1985	12	2,000
Higher institution for International Relations (ISRI), Maputo	1986	1	230
Nautical School of Mozambique Maputo	Upgraded 1991	3	
Academy of Police Sciences Maputo	1999	2	
Private			
Higher Polytechnic and University Institute Maputo + branch in Quelimane	1995	8	900
Catholic University of Mozambique (UCM) Beira + branches in central and northern regions	1995	9	1,000
Higher Institute of Science and Technology in Mozambique, Maputo	1996	7	650
Mussa Bin Bik University Nampula	1995	3	130
Institute of Transport and Communication Maputo	1999	3	

Higher Education Institutions in Mozambique (updated from Republic of Mozambique, 2000)

Due to the structure of the studies, it is difficult to estimate meaningful rates of graduation. However, at the two main public universities, the rate of graduates compared to the admission five years earlier seems to be around 50 per cent. The reasons for this low rate can be summarized in three categories:

- *Institutional:* poor linkages between secondary and tertiary education; inadequate curricula and teaching methods; poor planning; no research supporting the teaching; and poor infrastructure including libraries and ICT.
- *Individual:* teachers may not be well prepared and are too busy because of "moonlighting" activities; students in their turn may have problems of

adaptation to the university life; self-exclusion; insufficient study and time management skills.

- *External:* Opportunities for jobs before graduation; and financial problems due to poverty and adverse social conditions. (Republic of Mozambique, 2000).

Furthermore, there is an urgent need to reform curricula in HEI´s in Mozambique with regard to the objectives, the quality, and the relevance of the programs; the profile of the graduates; teaching and learning methods; flexibility of the study plans; measures for quality assurance; and interaction with society and the trade and industries.

Government strategy

In October 1998 a Strategic Plan of Education (1999-2003) for Mozambique was approved. This plan sets out perspectives for the global development of the educational sector and covers in detail primary education and teacher training, and with less detail the secondary and technical education, and very little for the higher education system.

As a consequence, the Minister of Education established a consultancy task force with objective to analyze the present situation of Higher Education in Mozambique and to propose a ten-year strategic plan for this sub-sector in consonance with the strategic plan approved for the Education Sector, defining objectives, structure, scope, financing and governance.

Signaling the seriousness of its intent to address these issues, the government formed a new Ministry of Higher Education, Science and Technology (MESCT) January 2000. This accelerated the resulting report "Analysis of the Current Situation of Higher Education in Mozambique" (Republic of Mozambique, 2000) and the preparation of the National Strategic Plan for Higher Education 2001-2010". The strategic plan was approved by the council of Ministers in August 2000 and forms the basis for a variety of initiatives undertaken in Mozambique higher education.

This was followed by a detailed plan of operation approved by the same body in July 2001 resulting in a ten-year program aimed at nation wide strengthening of Higher Education in Mozambique. The World Bank is one of the partners supporting the implementation of the ten-year national program through a 35 million USD project. The development objectives of this Higher

Education project (HEP) are to:

- Enhance internal efficiency and expand the output of the graduates,
- Improve equitable efficiency (gender, location, and socio-economic), and
- Improve the quality of the teaching-learning process and the relevance of the curriculum.

The key performance indicators include: An increase in the absolute number of students graduating in all HEI´s (from 786 in 2000 to 1,500 in 2006); an increase in the number of students from the North and Center of the country (from 10 to 15 per cent and 30-35 per cent respectively in 2006; an increase in the admission to total enrolment rate from 16.3 to 18.3 per cent (20 per cent is ideal) by 2006; Furthermore, Curriculum changes in selected faculties should show evidence of increased use of new and updated materials and computers for information gathering and data analysis; and, finally, *qualitative reforms in the teaching-learning process, in selected faculties, that provide strong evidence of an increase in the use of student centered, project-oriented approaches, integrated with computer use, and providing a measurable increase in the proportion who pass rather than fail the course.* (World Bank, Project Appraisal Document, 2002).

The pilot project – background and objective

A pilot project was undertaken by a Danish University Consortium in relation to the performance indicator regarding the implementation of *"qualitative reforms in the teaching-learning process by the use of student centered, project-oriented approaches"*.

The contact was established at a visit to the World Bank for promoting the Danish expertise with regard to educational consulting. The Danish University Consortium DUCED (Danish University Consortium for Environmental Development that includes seven universities in Denmark) was represented at this visit and presented their experience in educational co-operation with universities in Botswana, South Africa, Swaziland, Malaysia and Thailand under the DANCED program funded by the Danish Government. This program also includes the use of student centered and project-organized approaches, and DUCED was therefore invited to undertake a pilot study as a

basis for designing a full scale project for implementing a curriculum reform in Mozambique through the use of Problem Based Learning approaches. The pilot project was then organized through funding of 100.000 USD from the Danish trust funds at the World Bank.

The project team was established to include also a representative from the UNESCO Centre for Problem Based Learning at Aalborg University (UCPBL), and from the Danish Ministry of Science, Technology and Innovation, in total a team of four persons.

The Team visited Mozambique at three missions conducted in November 2002, August and November 2003 to establish modalities for institutional partnering between Danish and Mozambican universities under the umbrella of the government's strategic plan for higher education in Mozambique. The consultancy was commissioned by the World Bank as a preparatory investigation with regard to introducing a Problem-Based and Project-Oriented Learning Approach to higher education of Mozambique. The Terms of Reference, were specifically developed for this purpose.

The three missions undertaken in preparation of the PBL-Program dealt with the following issues:

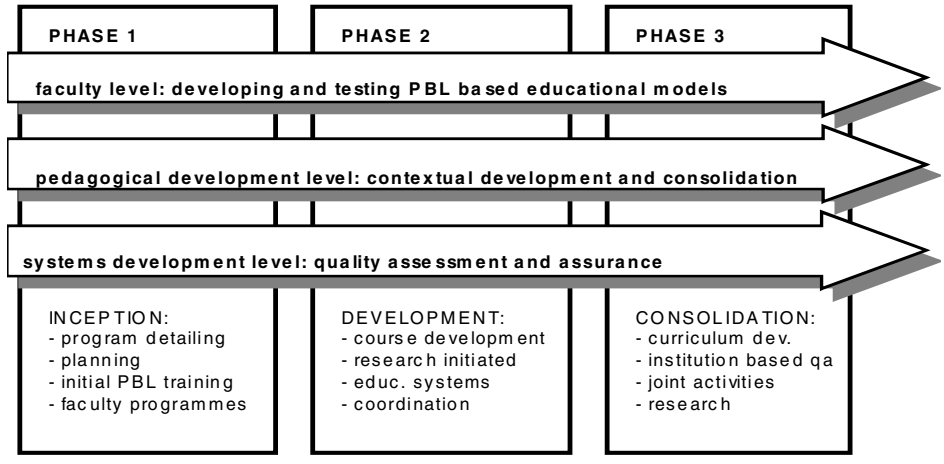
- Fact-finding and identification of potential piloting partners (Mission 0, one week, November 2002).
- Profiling the faculties identified, preparing for a PBL-workshop and having initial negotiations between the ministries (Mission 1, one week, August 2003).
- Conducting the PBL workshop and following-up with selected faculties and MESCT (Mission 2, one week, November 2003).

In conclusion there were clear indications from the universities and MESCT that a program should be developed and supported for introducing innovative pedagogical methods as discussed during the three missions.

The outcome

The final report presenting the proposal for a full scale project was presented and discussed at a fourth mission June 2004. The proposal was prepared in

cooperation with the Mozambique implementation group and included ten faculties in total (seven from UEM, two from UP and one from ISRI). The project is designed for eight years with a total budget of 8 million USD. The project is designed to take place at three levels of action to be carried out in three phases as shown in the diagram below (Enemark 2004).



The faculty level is the operational/professional level concerning implementation of new educational and pedagogical methodologies at the pilot faculties. Student centered and project-organized approaches will be applied through course and curricula development in accordance with the demands of the specific professional areas. This level should be addressed through twinning arrangements between the pilot faculties and corresponding faculties in Denmark (and, possibly, Southern Africa).

The pedagogical development level is the organizational/conceptual level concerning the implementation of educational models and organizational structures in relation to student-centered and project-oriented approaches. This will aim to foster the developmental university through interaction with the outside world such as the trade and industries. This level should be addressed through cooperation between the institutions responsible for educational development at the universities involved.

The systems development level is the most general level of analysis concerning the role of the universities within the society, the statutory framework, and the cultural basis. This will include development of relevant measures for resource and quality management. This level should be addressed with assistance from the Danish Ministry of Science, Technology and

Innovation in cooperation with the Ministry of Higher Education, Science and Technology in Mozambique.

The phasing of the project into a two year inception phase, a three year program development phase, and a three year consolidation phase will ensure that mutual reviews are carried out prior to commencement of each phase in order to determine whether the program shall proceed.

The final project proposal was very well received by all parties: the faculties, the universities, the Ministry, and the World Bank. It was agreed that the project meets the current needs of the universities. It would enhance the quality and relevance of higher education in Mozambique, and it would fulfill the aim and objectives in the strategic plan and the World Bank project with regard to the implantation of qualitative reforms in the teaching-learning process. Concerns were raised about the duration of the project and the level of budget, and with regard to the proportion being allocated outside the country. With regard to the funding situation it was stated, that the new funds must be generated possibly by the Danish International Development Agency (Danida) if the project were to be implemented using Danish universities´ consultancy assistance. This would follow the general procedure that country donors pay.

It was intended that a memorandum of understanding be elaborated and signed as a result of the fourth mission as a basis for implementing the full scale project. However, this was postponed due to the problems of funding the project.

The funding issue

During the missions, concerns were raised several times regarding the issue of funding such a project. From the very beginning it was indicated, that the full scale program should be realized through the funding from the World Bank credit. As discussions went on, this turned out to be a matter of opinion. At a certain stage the Moz. Minister indicated, that the credit was supposed to support activities within Mozambique and was not to be used on foreign consultancies. A project like the one we were discussing was expected to be funded by national donors such as Danida and not through the WB credit. This statement is of course understandable, even if it is not in line with the understanding of which the pilot project was initiated. Furthermore, it is well known that projects in the sector of tertiary education are not included in Danida´s overall development policy and strategic action planning.

At the same time, other projects were ongoing in Mozambique regarding quality assurance for higher education, concepts of Problem Based Learning, and concepts of university financial management. These projects were funded by the Dutch and Swedish national aid agencies and were not directly related to the overall World Bank project.

In this perspective, it looks strange that a high quality strategic plan for higher education like the one in Mozambique is not linked into an internationally agreed policy of funding that accounts for the various activities. The World Bank indicated that efforts would be made to establish the necessary funding from various donors (including Danida) but so far without any positive results. The Danish project team, this way, ended up to be responsible for acquisition of funding the project. This is, however, not considered a part of the general portfolio of the Danish universities.

In conclusion, the proposal prepared by the Danish team was not initiated due to the lack of (Danish) donor funding for implementation.

Lessons learnt

Capacity building support is urgently needed for higher education in developing countries. However, such projects are always a two-way activity. Capacity building projects, therefore, must be rooted in an organizational framework in the donor country. To develop such a framework in Denmark should be considered for several reasons:

- To support developing countries through capacity building in their home country and thereby underpin the concept of developmental universities that base their priorities, curricula and research on the structural needs of society and actively address those needs.
- To enable and support active cooperation with universities in the developing countries and thereby compensate for the new policy of introducing tuition fee for students from the third world to study in DK.
- To support and further develop the efforts of internationalization at the Danish universities and thereby better understand the role of and the basic conditions for higher education and research in the modern global world.
- To enable Danish universities to take part and compete on equal conditions

on the global market of consulting services within tertiary education and thereby support the wider aims of the Danish foreign policies.

Such a framework should include the key stakeholders such as the Universities, the Ministry of Science, and Danida. This is obviously a political issue, and not only an organizational task. It will include a cross-sectoral dialogue to agree on policies and financial arrangements that to some extent also include cooperation with the international donors such as the EU and the World Bank.

The universities – in both donor and recipient countries – are learning institutions, they are not teaching institutions. This means that, in a university, everyone learns continuously: the students, the technical staff, and the lecturers. University education is essentially the acquiring of self-learning capacity based on and supported by a high quality scientific foundation. University graduates need to be able to learn, and to unlearn in order to learn again, continuously (Brito, 2002). Building the capacity to develop such learning institutions and developmental universities in the developing countries is a huge challenge.

Higher education cannot be developed to the exclusion of other policy initiatives such as physical infrastructures, better governance, public health improvements, trade and financial market development – these are needed as well. There may be shortcuts to establishing educational infrastructure, but influencing people to understand and convey higher education values and best practice will take decades. Therefore, policy makers and donors should waste no time (World Bank, 2000). As H.G. Wells said in The Outline of History, "Human history becomes more and more a race between education and catastrophe".

Conclusions and recommendations

There is a need to commence the discussion of the role of the Danish Universities with regard to capacity building for higher education in developing countries. This is a political issue and the relevant stakeholders (the universities, the Ministry of Science, Danida, and also the trade and industries) will have to look at this from a modern and holistic view based on a more corporate responsibility.

The universities in the donor countries are not generally entrepreneurs in the sense of acting on a global market of consulting. Market oriented consultancies may be interesting for individual academics in certain

professional areas with the aim of developing professional understanding and new knowledge through participating as professional experts in donor projects undertaken by the international development banks and individual country development assistance agencies. But basically, the universities are focusing on education and research as their prime activities, and this does not include market oriented consultancies.

The capacity building activities therefore must be organized as a corporate effort of all relevant stakeholders. Such capacity building activities for higher education in developing countries are at the heart of the objectives of the western world universities. This kind of consultancy or reciprocity cooperation is the direct way to voice the need for internationalization and globalization at the Western universities. And at the same time it is the direct way to support and increase innovation in the developing countries. It is, as such, a win-win situation.

Beautiful Mozambique. Photo: Stig Enemark.

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V Working Groups and Final Plenary Discussion

Working Group 1

The Role of Donors in the Development of Knowledge Societies

Chairs: Jamil Salmi & Erik W. Thulstrup
Rapporteur: Ole Mertz

Other participants:

Michael Harms
Frands Dolberg
Poul Erik Rasmussen
Tomas Kjellquist
Anne Sørensen

- *What is a knowledge society? Is it the same in all countries?*
- *Most bilateral donors emphasize research capacity building; why is higher education often not mentioned? Is good higher education in the developing world a luxury?*
- *How can donors ensure that their Higher Education and Research (HE&R) capacity building benefits the targeted developing countries and not primarily rich countries?*
- *What can donors do to ensure that HE&R capacity built in developing countries is sustained? How can they ensure that it is used for the benefit of these countries and does not remain in ivory towers?*

- *Does S&T play a special role in this connection?*
- *Do donors in general cooperate efficiently with each other? Do they fully benefit from each other's knowledge and experiences? Do they coordinate their activities efficiently?*

Main issues

- Donor focus on primary (and secondary) education
- Why support higher education and research?
- Approaches to pro-poor support of higher education and research
- Advocacy
- Action

Donor focus on basic education – constraints for higher education

- Aid must be directly aimed at the poor – higher education considered mainly to benefit the rich
- Primary education traditionally associated with a higher social rate of return
- In SWAp-exercises Ministries of Education take part – but they are often not in charge of higher education
- Ministries compete over donor funds – science and technology ministries often marginalised
- Research is (reluctantly) accepted, but higher education is considered a luxury by some donors

… but also new developments in favour of higher education

- In Germany, the primary-tertiary education discussion is less polarized
- Kofi Annan has expressed UN support to prioritizing science and technology, including links to higher education
- NEPAD sees science and technology as playing a significant role in the "African Renaissance"
- Other initiatives at international level that are important points of departure for boosting national agendas.

Why support higher education and research?

- Economic growth one of the prerogatives for poverty reduction – higher education and research needed to ensure growth and achieve the MDGs
- Achieving poverty reduction is very complex and requires all levels of society to develop – capacity to implement development programmes often lacking
- Higher education has become basic education in developed countries – why should developing countries lag behind?

Approaches to pro-poor support of higher education and research (1)

- Accept that higher education is more expensive and outcomes take longer to materialize
- Ensure that capacity development has the dual focus of
- Developing (or reforming) institutions
- Developing capacity for research and learning at tertiary levels

- Coordinate donor policies and develop modalities for funding that
- Stimulate demand for knowledge, e.g. local competitive grant schemes
- Link research to planned or ongoing policy reforms
- Inspire north-south collaboration among researchers
- Ensure long term funding schemes needed to develop and sustain capacity for research and higher education (SAREC have 7-25 year commitments)

Approaches to pro-poor support of higher education and research (2)

- Support developing country alumni from universities in the North when they return, e.g. (German experiences):
- Small equipment and infrastructure grants
- Access to academic literature
- Support continued partnerships
- Make sure scholarships also go to poor people
- Universities should demonstrate that they can provide
- Research and higher education that contribute to poverty reduction
- Research which is relevant for and applicable in development programmes
- Promote and support existing networks and initiatives such as The Academy of Sciences for the Developing World (TWAS) and Nelson Mandela Foundation for Science and Technology
- Research: cross-sectoral and/or a separate sector?

Advocacy

- Large lobby for primary education – a similar lobby needs to be developed for tertiary education, e.g. through university consortia

- Expanding the constituency of the tertiary education lobby with NGOs, private sector
- Developing country alumni educated at developed World universities can be an important lobby group
- Canadian universities are particularly active lobbyists within this sector
- Universities in Sweden participate in development but are not active in policy debate
- In Denmark:
  - Rector's conference is the only official forum
  - Five research networks within development.

Action

- Strengthen lobby activities vis-à-vis policy-makers and donors with strong arguments
- Provide summary of conclusion from this workshop to relevant government agencies
- Strengthen Nordic/EU donor coordination for addressing the need for national research councils and development of higher education
- Conference in Sweden, organised jointly with Association of African Universities, May 2006

Working Group 2

Drain and Gain on a Global Scale Reciprocity in Development

Chairs: Julia Hasler & Jens Jørgen Gaardhoje
Rapporteurs: Ingrid Karlsson and Hans Gullestrup, Professor, Business Department, Aalborg University

Brain drain in developing countries

- *Brain drain in European countries*
- *Basing economy on a brain gain policy*
- *Success stories?*
- *Is economic growth in certain regions dependent on brain exchange?*
- *Is there such a thing as global responsibility?*
- *Are there alternatives to the brain deficit policy?*
- *Solutions for the developing countries*
- *Solutions for the developed countries*

"Disclaimer"

The group was very small and needed a more diverse membership particularly inclusion of participants from the developing countries that suffer from brain drain. We believe that this drawback has limited our creativity and we recommend that future workshops aim for a larger and more diverse group.

Concepts

What is *Brain Drain?* This is when someone is educated in one country and then permanently settles in another country, and where he/she is not contributing with "brain work" to his/her former home country. Brain drain also covers the situation where individuals leave a country, are trained elsewhere and then remain in the country of training in order to work, thereby contributing their brain power to

What is *Brain Gain?* This is when a university/business/country gains and uses the fruits of brain work from a person having most of his/her higher education paid elsewhere.

Usually neither *Brain Drain* nor *Brain Gain* is found in their true meanings. More often a person moves geographically from one place to the other but keeps in contact, and work to a certain degree, with old partners and colleagues in his/her country of origin. This behaviour is usually also appreciated by the new employee, since it brings in new contacts and working methods to the new place.

The reasons for leaving a country after having received a higher academic degree could be many. They can be economic, politic, scientific, or private. Usually the person from a poor country leaving for a richer country feel obliged to send money back home, but often they are also engaged in many ways of professional collaboration and networking. This phenomenon we can call *Diaspora Brain Circulation*, and it involves both physical and mental circulation of persons, ideas, and creativity.

Furthermore, *Brain Development* is a term which could be used in cases where the individual and the new professional environment increase its brain wealth through competence development. This is of course the case when, for instance, a person leaving his/her home country for political reasons is recognized as a brain resource in the asylum country. The authorities of the welcoming country thus helps the individual refugee person to develop professionally through, for instance, updating the education to new circumstances, levels of technology, language, cultural and religious contexts etc.

Brain capacity can also be misused. A particularly unnecessary way of misusing brains is when they are not used at all for advanced private enterprise or academic problem-solving; e.g. a medical doctor driving taxi cabs or a PhD in biology cleaning hotel rooms. This happens quite often in countries like Sweden and Denmark and is due to many difficulties in integrating those persons; it can

be due to shortcomings of the individual when it comes to learning the local language, but often it is also due to prejudices from employers. Many other problems could occur which increase difficulties in integration, for instance the shortcomings in cooperation and sharing of information between different authorities. This is a *Brain Waste* and needs to be much better understood, recognized, and counteracted.

Finally, *Brain Equalizing* is another threat which is seen more clearly, the more mobility of research students and researchers increases. With Brain Equalizing we mean for instance that only certain ideas, subjects, methods or cultural contexts are tolerated. This is harmful to the whole society because it lessens the diversity of thought and ideas and it decreases creativity. Brain Equalizing is sometimes done through political means, for instance when internet use is restricted or books and papers are censured. But the thinking of people can be mainstreamed to a harmful extent also through MSc and PhD study programs carried out by universities in rich countries – for instance it may concentrate too much on the use of modern technology, or it may disregard traditional knowledge.

Aims of the rich country

- It wants to gain, quantitatively and qualitatively, brain power and creativity for its own use and increase of wealth
- But – in relation to its financial aid for international cooperation – it also recognizes its responsibility in developing the brains for the benefit of poor countries.

Aims of the poor country

- The poor country wants to keep its good brains for development, e.g. for the same reasons as the rich country
- If there is no possible way to keep the brains (it is not possible to compete with salary levels or with working conditions compared to the rich country) it wants to keep contacts and build networks for future benefits.

Solutions for the rich country

- Increase possibilities for industry contacts
- Find interesting problems to solve together (e.g. formulate research problems in cooperation with colleagues from the south)
- Take good care of your PhDs and Postdocs to avoid isolation or brain waste
- Introduce your students to personal and institutional networks
- Counteract brain waste through programs for updating and development of education
- Give good opportunities for learning the local language
- Always underline that the free exchange of ideas and persons is a prerequisite for development of knowledge and science (e.g. in relation to visa requirements and other bureaucratic and legal hindrances to mobility of researchers)
- Build Diaspora networks and help to maintain them – these are a tremendous resource for linkages and contacts
- Be respectful to cultural social, religious and other differences
- Work to help in translation of essential books, software, manuals etc. to all main languages
- Don't try to equalize brains – we need the differences

Solutions for the poor country

- Salaries should not be too low
- Return grants should be developed
- Payments to the individual or research financing to the institution for returning home could be offered
- If aid from an international organisation or a rich country is offered, only training programs with strong links to the home country, or sandwich programs, should be accepted

- Building of well equipped institutions, libraries, computer facilities etc for the benefit of returning brains
- Develop annexes to famous institutes in the poorer countriesy (example: the network of Pasteur Institutes world-wide)
- Conscious work to counteract corruption to ensure that the absolute best brains goes into paid programs (this ensures a good motivation for all to work hard : I can't understand the meaning of this sentence
- Support to the Diaspora to maintain links with homeland, e.g. keep in contact through embassies, give support to Diaspora networks, involve in industrial and research institute development in the homeland; build links and bridges, support joint publishing and use well known and successful people from the relevant Diaspora as role models
- Increase the number of south-south meeting places
- Increase south-south cooperation to create interesting and creative working environments for the workers in S & T
- Increase the interest in research on intrinsic values and attitudes – and leadership development – why is there a big difference in development between South Korea and Ghana?

The solutions for the rich and the poor countries should be scrutinized and win/win-situations identified. Both types of countries should be much more conscious about finding win/win-solutions.

Working Group 3

The Role of Universities in the Development of Knowledge Societies

Chairs: Michael Oborne & Jens Aage Hansen
Rapporteur: Laura Zurita

Other participants:
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Susan Wright
Brigitte Gregersen
Leiner Vargas
Eskild Holm Nielsen
Søren Jeppesen – Unexus
Arne Wangel
P. Agamuthu
Malin Aakerblom

- *How do we perceive knowledge society?*
- *Universities and capacity building in South? Why do we do it? Main components?*
- *What kind of capacities should we build? How to interact with civil society? Vertical dimension, is there a balance between primary, secondary and tertiary education? Is there mutual interest? Interaction?*

Capacity building

It is important that we define what capacity is, and how we build it.

Capacity can refer to people and competences, but to infrastructure as well. Capacity building can refer to numbers (number of students that get a degree) or to quality (improvement of the curriculum).

When talking about collaboration between Universities in North and South, in the first phase it may be a transfer of knowledge. But when a certain level of understanding is reached, it should be a common creation and a process of creating knowledge together. Central to this process is the ability to communicate, to share values and purposes. It takes time in a research community to get to this point of creating knowledge together.

Knowledge based society

Why is it different from previous societies? Knowledge is one of the key resources and has always been a part of the society. What now defines knowledge society is the speed at which the knowledge is produced and discarded. Now we have to learn continuously, and use our knowledge in new ways in all sectors. The successful countries are the ones that make use of the knowledge. Thus, if Universities are to play a role in Knowledge Societies they must be able to both produce and disseminate knowledge.

Capacity in knowledge based society is about how to learn to use this knowledge. It could be interesting to use the term learning society instead, as learning is a dynamic process. The determinant factor is the capacity to combine knowledge in a productive way.

How do you measure knowledge? It is important when we make decisions to know what we get. It is not possible to measure knowledge directly. We can measure indirect indicators: spending in RD, in education, importance of the innovation in private sector.

Some indicators may not show real knowledge, spending is not necessarily productive. In order to strengthen our position we should show that there is a relationship between indicators (of knowledge and learning) and growth and/or welfare.

Capacity building in Denmark

How well is Denmark adapted to the world outside? Or, in a broader perspective, what is the role of the Universities in capacity building and in development? Where do Universities fit into the global economy? Are they becoming producer of commodities (in this case, graduates)?

All universities are facing the same challenges: Decreasing resources, increasing number of student, pressure to get involved in society. The role of Universities, as a result, is changing: Research is getting closer to society since the Second World War. The state is cutting funds, and at the same time demanding a bigger influence in the research agenda. Partnership with the private sector is gaining in importance, and the relationship between funding and independence can become an issue. There was a widespread consensus that the Universities should define their own research agenda, but in a continuous dialogue with society.

Universities should give research-based education, and impart a component of research and critical thinking in their education. However, the level of competences should be discussed with society- e.g. in some countries the industry consider that PhD. level is not useful for them – but still there is need for researchers and teachers at the Universities.

Criteria for evaluation should be in accord with the goals and methods, the evaluation criteria define the performance.

University is a complex environment. However, even acknowledging complexity, Universities should be able to define indicators they should be evaluated with. The Universities need to be accountable, and clarify how they contribute to the welfare and/or growth of the society they live in.

There are two models of university. In the one model, the University is a factory, producing knowledge and products, as opposite to an organic structure. The University is managed in order to get more production, there is more centralization and more dependence. This can be combined with a competitive orientation, where Universities compete with other Universities.

In the other model, that we prefer, the Universities are flexible systems, enabling environments that support innovation and research. The Universities collaborate rather than compete.

Reporting from the Closing Session: Can We Do Better within Higher Education and Research?

by Eskild Holm Nielsen, Associate Professor and
Birgitte Gregersen, Associate Professor, Aalborg University

Main conclusions

1. It is widely accepted, that Higher Education and Research (HE&R) are the crucial factors for creating and maintaining sustainable growth in developed countries. However, there seems to be a need to enhance the understanding among some politicians and DANIDA that this goes for developing countries as well. The long-term poverty reduction goals in contemporary development aid can only be achieved if the focus on capacity building within HE&R in the South is strengthened.

2. It is necessary to promote to donors and the broader society that capacity building within HE&R is a long-term, complex and uncertain activity that can only be successful if mutual trust between the involved partners is created. This requires long-term and stable (also in financial terms) collaboration. Furthermore, it is important to stress that capacity building is not a one-way knowledge transfer activity from the North to the South. It is a process of mutual learning between all the participants. It was underlined that the Danish universities who are active within capacity building in the South should take a more visible part in the public debate in these matters.

3. The need for donor coordination and collaboration was strongly emphasized. This also includes the need for university coordination and collaboration. It was especially mentioned that a Nordic alliance for promoting the role of universities might be useful.

4. There is a danger that the ongoing transformation of universities in the

North may favour collaboration with industry, research institutions and Networks of Excellence within the North, leaving little room and finance for activities related to capacity building in the South. As a consequence, there is a need to expand the portfolio of the universities in the North to include capacity building in the South as an explicit commitment. Such a commitment includes a broad palette of instruments: definition of the research agenda, scholarships, curriculum development, PhD education, management, institution building, knowledge infrastructure, etc.

5. It was suggested that the conference committee take the initiative to invite The Rectors' Conference, DANIDA, The Ministry of Foreign Affairs, and The Ministry of Science and Technology to a discussion of how the institutional and financial support for capacity building within HE&R can be improved within the Danish context. Such a discussion should involve the following questions:

    a. Is there a need for an independent body with capacity building within HE&R as its prime focus? (Should such a body eventually take the form of a "Danish DAAD" with universities and research organisations as the core members?)
    b. How can the portfolio of Danish universities be extended to include capacity building in the South as an explicit commitment? A related issue to this will be to agree on relevant measurements for capacity development.
    c. How should these activities be funded? What are the possibilities to stimulate "tri-part funding" between government funds, university budgets, and external funding from especially private industry? (Should/can capacity building within HE&R be considered as a contribution to achieve the Barcelona goals?)

VI Programme and List of Participants

Workshop Programme

Tuesday 17 May 2005

09:00-12:50 Plenary Session.
Capacity building in higher education and research and the brain gain/brain drain dilemma in S&T.

09:00-09:20 Welcome and opening, Mr. Jens Jørgen Gaardshøje, Professor, the Danish National Commission for UNESCO.

09:20-09:55 Mr Henrik Toft Jensen, President, Roskilde University.

09:55-10:30 Mr Jamil Salmi, Acting Director, Education Department, the World Bank, Washington DC.
Developing countries and the global knowledge economy: New challenges for tertiary education.

10:30-11:00 Ms Lene Lange, Novozymes, Denmark.
Opportunities and responsibilities of high tech industries.

11:00-11:30 Coffee break

11:30- 12:05 Mr Michael Oborne, Director, Multidisciplinary Issues, Global Science Forum and the International Futures Program, OECD.
Consequenses of current trends in S&T higher education

12:05-12:35 Ms Julia Hasler, Programme Specialist for Life Sciences, UNESCO.
The role of international organizations in handling brain drain.

12:50-14:20 Lunch

14:20-17:30 Working group sessions

Group 1: The role of donors in the development of knowledge societies.
Convener: Mr Jamil Salmi & Mr Erik W. Thulstrup

Group 2: Brain drain and gain on a global scale. Reciprocity in development.
Convener: Ms Julia Hasler & Mr Jens Jørgen Gaardhøje

Group 3: The role of universities in the development of knowledge societies.
Convener: Mr Michael Oborne & Mr Jens Aage Hansen

19:00-22:00 Workshop dinner at NBI.

Wednesday 18 May 2005

09:00–13:00 Plenary session.
The experience and lessons of donors and universities from capacity building projects related to knowledge society construction and development

Donor experiences

09:00-09:30 Mr Tomas Kjellqvist, SIDA. *Swedish experiences of university support and national research development in developing countries.*

09:30-10:00 Mr Finn Normann Christensen, DANIDA/ENRECA. *Donor experiences from capacity building proposals related to knowledge society construction.*

10:00-10:30 Mr Michael Harms, DAAD, Department for Development Co-operation, Bonn. *International academic exchange between capacity building and brain drain – the case of the German academic exchange service.*

10:30-11:00 Coffee break

University experiences

11:00-11:30 Mr Leiner Vargas, CINPE/UNA, Costa Rica, *Lessons to be learned from SUDESCA/DANIDA experiences in Central America.*

11:30-12:00 Mr Henrik Secher Marcussen, Roskilde University. *The experience from an ENRECA capacity building project*

12:00-12:30 Mr P. Agamuthu/UM, KL, Malaysia.
Globalisation of tertiary education and research – the Malaysian and Danish experience.

12:30-13:00 Mr Stig Enemark, University of Aalborg,
Capacity building for higher education in developing countries – A part of the western university portfolio?

13:00-14:30 Lunch

14:30-17:30 Plenary panel discussion
Can we do better within higher education and research?
Two introductory presentations and three short reports from the working groups.

Closing reception and departure.

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VII List of abbreviations

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AAU	Aalborg University
ARPPIS	The African Regional Postgraduate Programme in Insect Science
AUNP	Asian University Network Programme
BIOTEC	Biotechnology
CAMES	Computer Assisted Mechanics and Engineering Sciences
CB	Capacity Building
CBHER	Capacity Building in Higher Education and Research
CINEPE-UNA	The International Center for Economic Policy (CINPE) and the National University (UNA), Costa Rica
DANCEA	Danish Co-operation for Environment in the Arctic
DANCED	Danish Co-operation for Environment and Development
DANCEE	Danish Co-operation for Environment in Eastern Europe
DANIDA	Danish International Development Agency
DEA	Danish Environmental Assistance
DUCED	Danish University Consortium for Environment and Development
DUCED-I&UA	DUCED for Industry and Urban Areas
DUCED-SLUSE	DUCED for Sustainable Land Use and National Ressource Development
DAAD	The German Academic Exchange Service
ENRECA	Enhancing Research Capacity in Developing Countries
ESECA	The School of Agricultural Economics, Nicaragua
FUNDE	National Foundation for Development, El Salvador
GIS	Geographic Information Systems
HE&R	Higher Education and Research
HEI	Higher Education Institution
HEP	Higer Education Project
HRK	German Rectors' Conference
ICIPE	The International Centre of Insect Physiology and Ecology, Kenya
ICT	Information and Communication Technologies
ISCED	International Standard Classification of Education
ISRI	Higher Institution for International Relations, Maputo
IT&C	Information Technology and Communication
ITB	The Bandung Institute of Technology, Indonesia
KBE	Knowledge based economy
LDC	Least Developed Countries
LUCED-I&UA	Linked University Consortium for Environment and Development – Industry and Urban Areas
MDG	The UN Millennium Development Goals
MESCT	The Ministry of Higher Education, Science and Technology, Mozambique
MIT	Massachusetts Institute of Technology, UK
MUCED	Malaysian University Consortium for Environment and Development
NBI	The Niels Bohr Institute

NEPAD	The New Partnership for Africa's Development
NGO	Non-governmental Organization
OECD	Organisation for Economic Co-operation and Development
PBL	Problem Based Learning
PESA	Personal economic survival activities
PISA	Program for International Student Assessment
R&D	Research and Development
RS	Remote Sensing
RUF	The Council for Development Research
S&T	Science and Technology
SAREC	Swedish Agency for Research Cooperation
SIDA	Swedish International Development Cooperation Agency
STI	Science, Technology and Innovation
SUDESCA	Sustainable Development Strategies for Central America
SWAp	Sector Wide Approach
TFS	Traineeship and Field Studies
TWAS	The Academy of Sciences for the Developing World
UCPBL	The UNESCO Centre for Problem Based Learning
UEM	Eduardo Mondlane University, Mozambique
UGC	The University Grants Commission, India
UNDP	The United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UP	The Pedagogic University, Mozambique
WTO	The World Trade Organization

Here, at the beginning of the 21st century, it has become clear that knowledge is the raw material that will drive development for the foreseeable future. Countries able to control and produce this resource - based to a large degree on higher education and research - will have a clear competitive advantage in the global market. Unfortunately, there is also a dark side: some countries may be left even further behind, further increasing the disparity in the world.

This publication is the result of the international workshop held in Copenhagen 17 - 18 May 2005 entitled "How Can Manpower Needs in Knowledge Based Economies be Satisfied in a Balanced Way?". The publication discusses how to reduce brain drain, to foster capacity building in higher education and research in the weakest countries, and proposes new strategies for efficient development aid that meet the needs and opportunities of the 21st century.

The Danish National
Commission for UNESCO