Individualisation and diversification of higher education systems for mastering the challenges of the critical issues of the globalization

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ABSTRACT. The critical issues and challenges for education systems in the globalisation age will be analysed. The theoretical background for the improvement of the micro- and macro-education systems based on the theory of the competence transfer by networks will be explained and applied for the diversification of education systems. It is related to the particular relevance of individualisation and diversification as strategic success factor. The application of diversification is essential for improving the access to the educational markets. The future effects of synergy and prognostic development based on diversification in networks of higher education will be derived from special case studies realised by educational organisations and networks such as GUIDE.

KEYWORDS: Diversification of education, Fair knowledge transfer, Global educational networking, Individualisation of education, International competence transfer, Modular-design syllabus

Introduction

The need of efficacy of individual training at regional and national level was increased by globalization. The educational institutions have to react to the new situation, because larger markets are also characterized by very different demands on the resource provisioning. Nine times out of ten, the individual provider meets soon borders with his growth. One way to respond to these challenges is the greater centralization of resources in larger selected educational institutions. Several small units are merged into a large educational
organization. The disadvantage of this approach is that it creates very complex and partially monolithic forms of organization, which are even more difficultly manageable and controllable. Thus, efficiency losses are inevitable. The other way is to connect smaller units in an educational network, so that the unit is able to satisfy the requirements of the global education markets in a common and coordinated manner. Each educational institution has to fulfill some preliminary tasks such as the modularization and harmonization of the professional fields and contents taken by their areas of expertise, as well as the integration of the education modules in a common educational pool. Thus, it is possible to operate with a strong diversification of educational opportunities, depending on the circumstances of the regional education market demands and customer requirements as well as to provide a high quality and a wide profile as a small education provider in the network. The challenges and critical issues of globalization, and its impact on the development of education, will be overcome by better diversification even in the case of the increasing individualization of knowledge transfer. The theoretical and practical requirements for these options were created in various national and international projects. The results are applied in the practice of the development of various educational organizations, systems, and networks.

**Critical issues and challenges for educational systems by globalisation**

The permanent analysis of critical success factors characterising the various micro-regional as well as macro-regional higher education systems is the precondition for the development, growth, and competitiveness of any educational organisations. A critical factor is an attribute that may be characterized by an attribute value, which is necessary to reach an objective, which is essential for an organization. Critical success factors for individual educational institutions in the limited regional area are:

- Acquisition of new customers in the form of prospective students
- Provision of interesting long-term training and continuing education program of courses
• Satisfaction of the educational demands in the region
• Provision of resources for education programs offered and planned
• Fundraising and development of project promotion, research grants and public funds
• Extension of the own laborative and technological basis
• Development of a regional network of stakeholders
• Securing the financial basics.

If these conditions are met, the organization usually pushes the limits of growth, thereby the expanding of its sphere of influence beyond the region will be required. This creates new challenges, and thus new success factors arise. These include:

• Exchange of prospective, part and full-time students with other education organizations
• Development and offer of common programs of education and training in cooperation
• Satisfaction and development of the transregional requirements for education
• Acquisition of funds for project, research and support networks
• Design of real and virtual laboratory and experimental worlds
• Cooperation with other regional networks of stakeholders
• Diversification of sources to secure financing.

The challenge of analysing, evaluating, modelling, and developing the education systems is imposed by the internationalisation of the education, as requirement and result of the globalisation of the economic, scientific, and technical systems. New aspects of the design of educational systems arise through globalization. The diversity of the various educational systems is based on:

• Variety of educational concepts
• Different views of life, life models and life goals
• Differentiated method, model, and conceptual worlds
• Various technical equipment and conditions
• Cultural and linguistic differences
• Climatic and temporal characteristics of each region
• International cooperation and global competition.
The complexity and the intricacy of the systems, processes, and functions become extremely difficult and dynamic, because of the huge number of elements, objects, relations as well as time and space dependence. There are particularly critical issues, some of which are of a general nature and valid for all education systems, and some of which are specific to individual education systems (Figure 1).

<table>
<thead>
<tr>
<th>Critical Issue</th>
<th>General Nature</th>
<th>Individual Nature</th>
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<tr>
<td>Educational policy</td>
<td>Kind of state political system</td>
<td>Type of organisational policy</td>
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<td>Life model</td>
<td>Collective or individual society</td>
<td>Organisational educational model</td>
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<td>Methods and terms</td>
<td>Global unification or national particularity</td>
<td>Embeddednes into international or national educational networks</td>
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<td>Labour, technical and financial resources</td>
<td>Educational resources of countries and nations</td>
<td>Resources of single organisations or networks of education</td>
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<td>Foreign languages</td>
<td>Access to the international main languages</td>
<td>Internationalisation and regional linguistic particularities</td>
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<td>Regional specifics</td>
<td>Climate and time zone</td>
<td>Regional adjustments of offers</td>
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<tr>
<td>International cooperation and competition</td>
<td>Fair education and knowledge transfer</td>
<td>Specific competitive context of educational organisation</td>
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The critical analysis of the issues in the context of globalisation enables the persons in charge to find out what are the key performance indicators for higher education systems. For this, the following questions are essential:

- Are the political and educational systems of the participating international partners compatible?
- Can the different living and working models of the involved populations in the context of education be coordinated?
- Is there a common and fair basis for funding and the mutual contribution in knowledge transfer?
- Is it possible to combine and integrate the different models and conceptual worlds together?
• Will internationally coordinated technical and laborative conditions be created by networking and virtualization?
• Can the time and language barriers be overcome by asynchronous communication and special global offers?
• Is cross-cultural understanding of the globally active community transferrable to regional education demanders?
• How are international cooperation and global competition put into a reasonable balance?

The fact is that all these issues must take place in the context of global networking. Therefore, important scientific inputs were created in the form of new theories and practical approaches of knowledge and competence transfer by networks in recent years.

**Common theories and models for the competence transfer by networks**

Innovation means that based on the current state of knowledge, new solutions can be created. The development of micro-regional and macro-regional education systems is directly linked to the human existence and culture. Therefore, appropriate theories, models and proposals were developed and experiences have been gained for many years. The theory of networks of competence supports a complex and useful approach for the exploration of the dependences and processes of interaction in cooperation networks and the interfaces of the systems. It was developed for the investigation of real process networks in enterprises supplemented by studies concerning the related information and knowledge flows. Based on the theory of expert networks, more detailed studies of the first research approach have been made for the better understanding of the interaction of knowledge edges and knowledge nodes in a multi-level system. It consists of five layers and can be used as a theoretical starting point for the modelling and description of competence transfer and the design of the architecture of educational systems as knowledge transfer systems (Figure 2).
The second part of the research was directly referred to the development of education systems. First, a cell of competence is generated in the form of an educational institution. In general, this cell will take over training duties in the immediate environment in the region. A micro educational network as the core network will be created by the cooperation with allied educational institutions. This micro-educational network will establish relations with other similar networks. This network will be gradually interconnected, thus forming so-called macro-educational networks as networks of networks (Figure 3).
A comparison of the innovative approach and the experiences gained by the application of the theory, according to the local and regional needs, is possible and will be done in order to explain the competence transfer by education networks.

Derived from previous experiences of the creation of own networks, the following stages of development can be derived:

1. Development of the university as a competence cell for selected profiles in particular as professional staff developer for regional companies.
2. Regional and national networking with other educational institutions to complement and raise their own profile.
3. Selective international links to improve the know-how of international and intercultural cooperation and certification.
4. Participation in and cooperation with regional and national networks in education to expand the area of influence, for the exchange of experiences, and for the development of synergies.
5. Participation in and cooperation with international networks in education to expand the area of influence, for the exchange of experiences and for the development of synergies.

On one hand, the institution retains as own competence cell usually. On the other hand, it is possible by increasing the degree of integration in their own and allied networks with a much greater degree of integration to generate complex training programs and to develop to a greater extent professionals in cooperation with other educational institutions. A fundamental precondition for the successful expansion is the innovative application of the common theories and models for the transfer of competences by networks.

**Particular relevance of individualisation and diversification as strategic success factor**

The educational organisations have a variety of new development opportunities for the increasing internationalisation of all fields of the society, but they are confronted with completely new challenge too. Due to the scope of the tasks it is important to cooperate more and to be better connected. The universities and colleges will become one part of the educational market with different kinds of fellows, partners, and contractors as well as competitors, rivals and opponents (Figure 4).
The key question for success in the competition is to generate a unique characteristic. The individualisation by diversification of the educational programs in a growing market is one of the main challenges and key success factors. They could help to satisfy the requirements of more and more different target groups with increasing demands for quality, service, and competence. The following procedure is feasible for it:

1. Logical structuring of the individual fields of knowledge in modular form building modules that are multivalent.
2. Creation of unified module pools from which demand-actuated, individual training opportunities can be derived.
3. Incremental expansion of the pool of training modules and its coordination with appropriate partners from the education networks.
4. Creating of an advanced pool of training modules as network facilities for the joint use by several educational institutions.
5. Derivation of flexible and specific training paths and training opportunities from the unified inventory of modules for the knowledge transfer based on individual education paths.
6. Development of standardized educational paths as the
universal set for defined and generally recognized degrees and certificates

7. Generation of individual training paths based on the educational modules, including development of a recognition system for standardized degrees and certificates

The advantage of this process model is that individual educational units are derived from several monolithic educational offers by diversification. They are then subjected to standardization in order to provide them in a pool of modularized training units afterwards. Thus all conditions are met to generate different individual learning paths, to serve different target groups individually or in clusters by using a diversified education and modified modular system. The critical success factor is the standardization of educational elements and their arbitrary combination, which in turn has a beneficial effect on the degree of reusability, interchangeability and flexibility, evaluation and quality of educational offers. This aspect is of such a high importance that it is seen as a strategic success factor for the further development of individual educational institutions in the context of complex educational networks as part of the advancing globalization (Figure 5).

It is visionary and strategically important to establish universities and educational networks as service and facilities networks. Therefore, the educational organizational create trusts, networks, and consortiums to be viable to fulfill a broad range of different customer’s requirements by complex offers of individual services. The examples exist in terms of education networks: such as EDEN GUIDE IACEE, etc., and the conclusion can be drawn.
Application of diversification for improving the success in educational markets

Individualisation generated by diversity requires the application of all available means and methods and of the latest technologies, organisational forms, methodological approaches, etc. The key question is to acquire an efficient and sustainable access to the learners, demanders and potential parties.

The classical learning methods are increasingly supplemented or even replaced by electronic and mobile concepts for the knowledge transfer. Already today, it is possible to achieve degrees as well as certificates on the basis of asynchronous modes of communication ensuring time and location independency. The mobile learning is currently promoted by the Web 2.0 to a great extent (Figure 6).
The proportion of classical and modern forms of knowledge transfer is varied in the design of new courses in order to optimize the learning processes according to the target group specifics. Thus, new forms of studying as well as transfer of competences and knowledge must be developed which are closely linked to the approved kinds of distance education and online studies supported by e-learning, m-learning, and blended learning. In the past, a lot of different developing projects were finished with interesting partial solution whose integration in the process of application leads to new strategies and ways of success. Their use in complex micro-education and macro-education systems becomes increasingly state of the art.

An interesting project of a group of educational institutions has included the use and application of multivalent target-oriented knowledge modules as part of a complex of knowledge pool. After structuring the contents, the semantic has been developed for creating an individual, on-demand generation of study courses (Figure 7).
The provision of the study documents and learning contents will be realized course-wise supported by a multidimensional system of knowledge distribution, in which may be varied as dimensions: the knowledge of the learner, the optimal methodology used and the type of delivery channel and devices. Thus, the methodological and technical conditions are created to provide diversified educational modules for the use in the design of multivalent need-based forms of learning through channels varying due to the situation.

The next peak of the development could be achieved by merging of the systems of education and training, competence and knowledge transfer as well as network and collaboration management in the near future.

**Future synergy effects based on diversification in networks of higher education**

Well organised and strategic-oriented educational organisations implement such models and concepts in the educational markets carried by macro-education and micro-education systems recently. They will be only successful if they are able to generate a modular-design system for education including a set of educational organisations and institutes. The permanent, divers and multiple reuse of once before developed system parts, processes, methods, objectives, etc. in different relations and situations is the silver bullet.
for generating efficiency, sustainability, profitability, and power.

A lot of regional, national and global projects are dynamically developed and extended recently. They are realized by selected case studies completed by theses concerning transformations and future synergy effects based on diversification in networks of higher education. The projects can be classified into different clusters (Figure 9).
The following developing projects are suitable as examples and used for further research in the framework of case studies as well as for application in education and training (extract):

1. Expert Systems and Knowledge Engineering. Bilateral German-English University and industry cooperation project.
3. Multimedia-Based Training in Plant Planning and Modeling. Bilateral German-Russian academic cooperation project.
4. Multi Media Presentation in Engineering. Bilateral German-Welsh University and industry cooperation project.
5. Multimedia Application in Engineering. Bilateral German-Latvian university and industry cooperation project.
6. Content development for regional education portals. Multi-university project.
7. Reorganization of Information Management and Systems for Global Business Processes. German-Swiss University and company research project.
8. Telework in SME. Academic applied research project.
9. Extended View to the Universal Internet Working Platform Proposal (Second Opinion). German-Swiss University and company research project.
10. Media Competence. European content development and application project.
12. Business and provider modeling for business educational markets. Regional network developmental project.
15. Strategy and model development for job-oriented and occupational training and education of academic specialists and future leaders, in particular process modeling for the education processes. Research complex for the EU project "Innovative actions and development of a strategy for youth-
oriented, local employment policies. Large-scale cooperation project of industry, universities and policy.

16. Regional knowledge transfer. Multilateral R&D project for the knowledge transfer for high-tech subjects in SME.

17. Educational market implementation and extension. Regional application project.

18. Modeling of the provider and user processes in educational markets. R&D cooperation project.


21. Last-Mile-Solution for e-education competence clustering for the regional knowledge transfer and education export. EU regional support project for universities.

22. Live Stream Learning with RSS functions for mobile and stationary learning in education and further training. Subproject Software systems. National R&D project.

23. Development of the concepts and systems for a large-scale use of e-assessments in universities. Multilateral R&D university project.

24. Regional e-competence certification: e-competence for the internal enterprise communication in LLL. National-European project for a network of regional universities.


26. Strategic development of the integration of the non-academic and academic education. Research subproject of a national research network program.

27. Media production in project management. University R&D project for the content development for the international cooperation and summer schools.

28. Media production in online diagnostics. University and industry R&D project for the content development in international study programs.

29. Expert support network for the promotion of young scientists. European project for regional development of professionals.
30. Development of online courses in International Management. Bilateral national University project.

In addition to the many bilateral relations and cooperation, the projects generates the experiences, skills, and knowledge for the successful participation of a single university in the development, implementation and exploration of new kinds of regional, national and global educational networks such as Educational Portal Saxony, Educational Market Saxony, Federal Association for Distance Education, University Alliance for Distance Education, European Distance and E-Learning Network, Global Universities in Distance Education, Sino-German University, Mexican-German University of Applied Sciences, etc.

Summary

The University of the Future will use the individualisation and diversification of higher education systems for mastering the challenges of the critical issues of the globalisation. Therefore, several interdisciplinary projects help to penetrate the very complex problem and to provide the necessary inputs and resources. The key question is: How will be controlled and mastered the transfer of knowledge under the terms of the dynamic development of a globalized world. The challenge for the single university is to develop the own competences, experiences, knowledge, funding, etc. to such an high quality and quantity opening the opportunity for networking in the regional as well as global world of learning and training in cooperation with the important stakeholders and the right partners.

Sintesi

Lo studio, condotto dall’Università di Zwickau in collaborazione con quella di Shangai, riconosce nell’individualizzazione e nella diversificazione dei sistemi di Higher Education gli strumenti essenziali per affrontare con successo le principali sfide che la globalizzazione pone ai sistemi di istruzione e superare quindi le criticità che ne derivano.

Entrambi i fattori strategici individuati richiedono l’adozione diffusa di macro e
microsistemi educativi fondati, dal punto di vista teorico, sul trasferimento di competenze attraverso le reti e sui relativi modelli e approcci metodologici.

L'internazionalizzazione che investe tutti i settori della società, infatti, da un lato offre alle organizzazioni impegnate nell'istruzione e nella formazione straordinarie possibilità di crescita, dall'altro le costringe ad una integrale trasformazione. Di conseguenza, le università, partecipando al mercato dell'istruzione globale insieme con una miriade di attori – individui, partner, contraenti e, specularmente, concorrenti, antagonisti e avversari – debbono necessariamente cooperare di più ed essere connesse in maniera migliore, più stabile ed efficiente.

La carta decisiva da giocare oggi nella competizione mondiale per sopravvivere ed affermarsi con rinnovato vigore è quella di possedere una caratteristica unica. Appare in tal modo chiaro il ruolo dell'individualizzazione, assicurata dalla diversificazione dei programmi: essa è cioè in grado di soddisfare le esigenze di gruppi target sempre più differenziati, con bisogni crescenti in termini di qualità, servizi e competenze.

L'individualizzazione, frutto della diversità, esige lo sfruttamento esperto di tutti i mezzi e i metodi disponibili grazie alle più recenti tecnologie, alle forme organizzative e agli approcci metodologici attualmente al centro del dibattito internazionale, perché si possa allargare significativamente, in modo sostenibile, l'accesso ai mercati dell'istruzione e della formazione da parte dei discenti, dei potenziali contraenti e di tutti i soggetti interessati.

Il contributo pone poi una domanda cruciale: come si potrà controllare, gestire e governare il trasferimento di conoscenze nello sviluppo dinamico del mondo globalizzato? E costruisce la risposta passando in rassegna numerosi progetti interdisciplinari, realizzati a livello internazionale all'interno di reti, partenariati e accordi fra istituzioni accademiche e di ricerca, realtà locali e imprese.

La ricerca, mediante l'esame critico di una selezione di studi di caso sull'argomento, mette infine a fuoco gli effetti futuri delle sinergie e lo sviluppo prognostico basato sulla diversificazione nelle reti dell'Higher Education. L'università del futuro dovrà puntare su entrambe le componenti chiave, individualizzazione e diversificazione: dovrà, in altre parole, sviluppare le proprie conoscenze, competenze ed esperienze, trovare adeguate fonti di finanziamento fino a raggiungere un'alta qualità e quantità, partecipando attivamente alle reti regionali e globali, creandone di nuove e cooperando in modo propositivo con gli stakeholder e i partner.