Higher Education Analytics in an International Contex

Gyöngyvér Hervai Szabó
Kodolányi János University College
Székesfehérvár Hungary
e-mail: gyongyver@kodolanyi.hu

***Abstract* – Higher education institutions entered the global higher education service sectors. The sector is specially governed, because all countries decided to save education institutions from globalisation processes, form free trade economic order.**
In case of different regional integrations, the sector started to adapt to business environment similarly to regional quality movements. Different regional integration quality modells and orginisations behind the models developed theirs own sectoral quality systems for higher education. This was a very important factor for development higher education analytics. The other factor as global accreditation movement, based on regional models were also important.
Higher education analytics is also driven by IT firms, interested in development SMART solutions for higher education institutions.
Most important factor for development higher education analytics, is the business competitiveness factor:

- **how to lessen the costs of new programme development, and programme improvement**
- **how to use effectively moduls for programme evaluations,**
- **how to use higher education analytics for understanding student expectation and behaviour, for planning workload, responding the changing demand.**

Solutions for the academic lifecycle management are numerous. It is interesting how they fit into new strategic management programmes?
Strategic planning in case of higher institutions is dominated by old practices, practices accepted institutional development planning systems. New trends are connect the planning with score card models: mainly with Balanced Score Card system, but t is rarely connected to EFQM model, or Public Score Card sytem, or Kanji Score Card, or Baldrige model. The higher education analytics is important device for understing an institution competitiveness: and different quality approaches can offer different needs in analytic model development.

At the end of the first decade of 21st century higher education became a very important service industry. Questions concerning higher education development are connected to action analytics: to measuring and improving performance that matters in higher education. The performance of higher education is in the very heart of public policy debates in Europe, in the case of the USA, and of Asian higher education. Newly developed business intelligent systems are proliferated, and the main IT firms developed their solutions, and they are capable of more advanced solutions. Higher education databases are important in the case of Hungarian higher education development. The question is the following: there are higher education institutions capable of using developed higher education databases for strategic purposes. The higher education management system capabilities are highly connected to service management and service marketing models and new development in business processes: developing service conceptions, service delivery systems, images, culture and philosophy and customer and market segmentation.

The main question of the paper is the following: Where is the place of higher education analytics in higher education service management theories and practice? [1]

What are the functions of higher education analytics in management dynamics? The first part of the paper is about higher education institutions as complex sensitive systems, strategic HRM and students as clients, co-producers and co-creators. The second part of the paper is about higher education marketing models developed during last years, and database research techniques as new models for marketing. The service-dominant logic in higher education marketing can be a new model for marketing, customer relationship and stakeholder marketing.

Higher education institutions are treated as traditional academic organisations, with old fashioned department and faculty structure, traditional public policy formed management systems, while a lot of new units have been formed in different faculties, at senior management level. Higher education institutions belong to service industries with superior status, because the knowledge is built into the structure, products and services and advanced internationalisation. The basic contradiction is between highly qualified professional knowledge of university senior managers, and theirs leadership capacity. New higher education management information sytems can add a dynamic diagnosis concerning the quality of institutions and faculty management. The basic competencies are to ensure profitable process management, good human capital, good service moral, good enrolment, retaining students, and get good results for customers. The weak performance is about bad economic performance, weak indicators of growth, grading down in higher education rank table, low professor morale. Recent years have been highly stressed with Bologna-process: the service system has become very complex, the enrolment system is unequitable, development of new education

programmes need professional development teams, and higher education institutions and universities deal with student information systems and other databases concerning higher education services. [2]

COMPETITIVENESS IN HIGHER EDUCATION

Strategic HRM in higher education became the vital source for competitiveness. Higher education institutions knowledge component of education staff has grown dramatically, and the professional staff's most important role is a brand-making one. But university personnel is a complex one, behind the brand-making actors, there are sound groups around whom a programme is organised, and there are a group of teachers on peripheries. Among the personnel, there is a new layer of experts, who have to deal with sound accreditation burocracy, and mismanagement between faculties and student administration offices. We can see a development of back office systems, and opening call centers and student information offices with standardized situation handling and behaviour.

New trends in the Bologna process rearranged student enrolments, and traditional university faculties became the eyewitness of mass enrolments, and the traditional faculty personnel have to deal with complex subject and student management. The poorly developed programmes, stuffed with the subjects of the old 10 semester programmes into 6 or 7 semesters, valuing 1-2 credits by subject, together with large number of students, and permanent accreditation pressure caused high tension among the professional staff and professional administration. So in the case of higher education institutions across Europe, higher education has become a critical service sector, with high social impact and high social tensions. International competition has led universities to use business management models and technics, and quality movements have had a great influence on institution competitiveness. Quality movements and quality models were different, mainly static models became more known and used, contrary to dynamic models used by ENQA and some national accreditation agencies.

In the context of the Bologna processes, new trends concerning student's role in development of student learning management competencies remained out of the university management focus. For students, higher education became very complex, there are no clear connections between programmes and carriers, decision making without counselling can lead to bad choices. Student administration needs complex knowledge, and learning routes became very complex and blocked by different administrative rules. Counselling and self-management systems are very important for an effective learning management.

SUSTAINABILITY OF HIGHER EDUCATION AND HIGHER EDUCATION ANALYTICS

Recent trends of higher education analytics are focused to understand decision making of prospective students for marketing and communication strategies, to understand what is working and what is predictive. The most important questions are how a university can fine-tune its recruitment strategy, what is a winning and what is a loosing strategy like? [3]

Higher education analytics means the use of evidence to improve policies, programmes and services. We need adequate IT capacity to meet the demand for data and institutional research, to form information policies and procedures to ensure integrity of data collection, to develop IR staff capacity for data analysis and research, to educate and assists university personnel to use data and research to improve programmes and services. One of the most difficult things is to idenfy achievement gaps. It is not common to routinely collect, analyse, and report longitudional data on cohorts of students to track their progress and outcomes. Universities have to conduct surveys and focus group interviews with students, faculties and staff regularly to identify strengths and weaknesses in programs and services, as well as opportunities for improvement, refine strategies for addressing priority problems. [4]

Performance includes both operational performance (administrative and support systems) and academic performance (design and execution of academic strategies to achieve learning experiences, outcomes, and real-world competencies). Pervasively improving performance requires coordinated measurement, intervention, and action across the entire education/workforce spectrum. Such performance improvement will require more effective articulation and transitions between learning enterprises and between learning and work. It will require earlier, more effective stimulation of learners so that they can acquire the skills essential for success in the global economy. Working across the entire education spectrum of learning/work requires new solutions and techniques, including the sharing of contextualized "actions that work" in improving performance. Clearly, new processes and performance indicators must be developed to measure the emerging life, education, and work skills necessary for our changing world.

But how can we put more action into analytics? Six primary actions are needed to evolve from the current generation of academic analytics (tools, solutions, and services) to *action analytics.*

1. Focus on processes, solutions, and behaviors, not just on the acquisition of tools.
2. Incorporate workforce factors in higher education curricula and educational offerings.
3. Utilize the new generation of open-architecture analytics to enhance access, affordability, and success for learners and to extend the Enterprise Resource Planning stack.
4. Incorporate cross-institutional and inter-sectoral comparisons into solutions.
5. Develop new practices/solutions that ensure the alignment of institutional goals, strategies, initiatives, interventions, outcomes, and measures in a variety of ways, including alignment from institutional to college to department to program levels.

6. Develop organizational capacity and change culture to encourage evidence-based behavior and action-focused innovation to improve performance.

Advanced Models for Higher Education Analytics: Educase Center for Applied Research

Most universities placed a greater degree of importance on reputation (prestige) than on improvements in academic performance. In practice, academic freedom too often translates into autonomy rather than accountability, making concerted action more complex. The most advanced solutions are currently found in for-profit educational enterprises and corporate learning, where performance analytics are a fundamental, guiding principle and practice: a group of leading-edge colleges and universities are deploying new practices: fusing institutional research and assessment to create robust "institutional effectiveness" capabilities:

1. Generating the first wave of "academic analytics" focused on improving admission and student retention and related operational performance by implementing executive dashboards that provide leverage points for improving performance and accountability
2. Utilizing the application of measurement, process improvement, and behavioral change to consciously stimulate a "culture of measurement and improvement"
3. Reinventing articulation and transfer practices that are spreading across institutions
4. Introducing learner-centric and co-curricular analytics.

On the other hand, many institutions are struggling with academic analytics. An EDUCAUSE enter for Applied Research (ECAR) survey conducted in late 2004 suggested that many colleges and universities harbor the illusion that they can achieve satisfactory academic analytics by simply bolting on, to their existing student information system, some rudimentary data marts/warehouses, report writing, and extract, transform, and load (ETL) capabilities.9 In reality, a new organizing, analytic, and presenting layer and changes in behavior and culture are needed to move from data to reporting to analysis to action. (1.2008.)

Creating a Culture of Measurement, Performance and Action

Advancing performance measurement and improvement in a college or university requires changing from a culture of reporting to a culture of high-agility, evidenced-based decision-making and action. Such cultural change calls for committed institutional leadership and attention to navigating change and to transforming behaviors at all levels. Across higher education, far-sighted executives are finding ways to emphasize performance, creating incentives to support innovation, fostering change in the traditional academic culture by modeling new patterns of behavior, and building new capabilities. In the case of the Hungarian higher education Management Information System planning (AVIR) is the most important aim to get an insight into higher education as a state public service, with normative planning system- using BSC methods. There are a lot of incentives missing for creating new culture and new capabilities.

Improving Transferability: Courses, Competencies, and Curricula

A renewed focus on improving articulation and transfer is another innovation yielding tangible value to students by reducing costs and time to degree. A number of state-level efforts seek to provide seamless articulation and transfer between institutions in credit systems. But progress is slow, and many students still complain about having to repeat too many courses. Higher education remained so closed in Hungary as it was in the pre-Bologna system, and in the earlier stage of ECTS system in Hungary.

Learner-Centric and Co-Curricular Analytics – for Life

The most powerful action analytics are learner-centric, focusing on issues related to access, affordability, and success for learners at all stages of their learning lives. Over time, these analytics will empower learners to take greater responsibility for their success, in collaboration with parents, teachers, mentors, and employers. As learner-centered analytics spread through portfolios and other media, these capabilities will also become more portable.The emergence of learner-centric analytic tools is supporting student affairs, divisions in developing innovative measurements to quantify the impact of programs focusing on service learning, leadership development, and student engagement. The pedagogical foundation for these new measurement strategies is perhaps best articulated in "Learning Reconsidered", which argues persuasively for the assessment of students' personal development and experiences outside the classroom as an integral part of the collegiate curriculum. In practice, the University of Baltimore and other leading institutions are utilizing the SA LINK system to document co-curricular "learning outcomes." This system captures information on participation in leadership workshops, student government, and student organizations and uses dashboards to combine this data on students' involvement with their academic and demographic profiles, providing new insights into the importance of both curricular and co-curricular development.

Action Analytics at Work

A key ingredient of action analytics is embedding workforce requirements in educational curricula. With better data, better analysis, and better tools universities and colleges can develop early intervention strategies for each student based on personalized e-folios. The faculties will require resources to intervene and remediate and to sustain success. These resources can be deployed with

more efficient and effective programs and services when aligned with the action analytics model. Clearly, one size does not fit all in action analytics. Most institutions begin predictive/dynamic modeling by focusing on admissions and retention. Some major research universities are most interested in improving the performance and accountability of their grants-management operations and/or in applying dynamic modeling to human resources and financial management. Other institutions begin action analytics in student affairs and co-curricular development. In many ways, action analytics is like a smorgasbord of options, all aligned with institutional goals and strategies. Analytics can be launched in specific, targeted areas and can then be expanded along new migration paths as administrators, faculty, staff, and students learn to incorporate analytics as a key element of decision-making.

Open Architecture Enables Action Analytics

To reach their full potential, the new generation of performance measurement and improvement solutions depend on the widespread dissemination, development, and adoption of open-architecture applications in higher education. Open-architecture approaches are opening up "the stack" of existing, tightly integrated administrative ERP applications (student, financial, human resources, financial aid, alumni, advancement) and academic ERP applications (course management and ancillary systems). (1.2008)

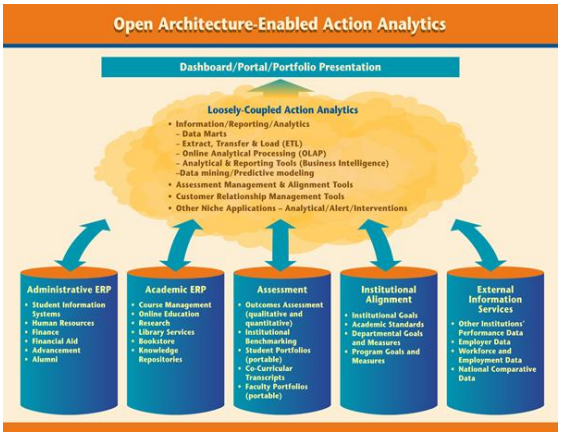

Figure 1. (1. 2008) Donald Norris, Linda Baer, Joan Leonard, Louis Pugliese, and Paul Lefrere.

This new model for management information system is differeing from the Hungarian model because of the centralised nature of the Hungarian system.

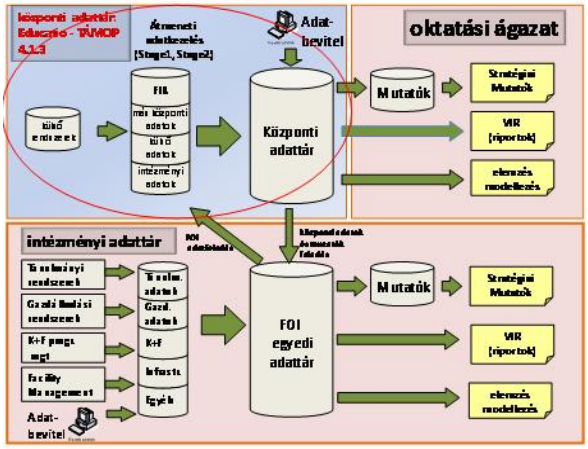

Figure 2. http://www.felvi.hu/felsooktatasimuhely/avir/kozponti_adattar (date of download: 5. Nov. 2010.)

In the case of the Hungarian model the emphasis on national higher education sectoral questions, the whole model is created for serving central administration and focuses on student admnistration, business admnistration, R&D facilities and facility management.

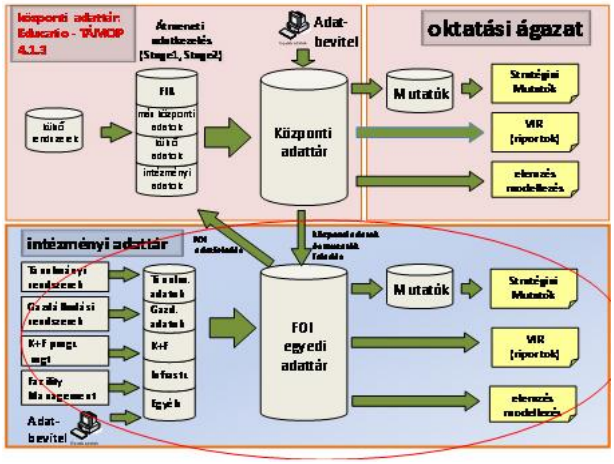

Figure 3.

The American, business model is rather focusing on academic course management, on performance assessment, institutional alignment and what is more important, on external, incoming data services.

The American model focuses on measuring performance: The measurement area – changing institutional capacity, culture and behavior – encompasses four capabilities: technology, information, analytics and innovation.

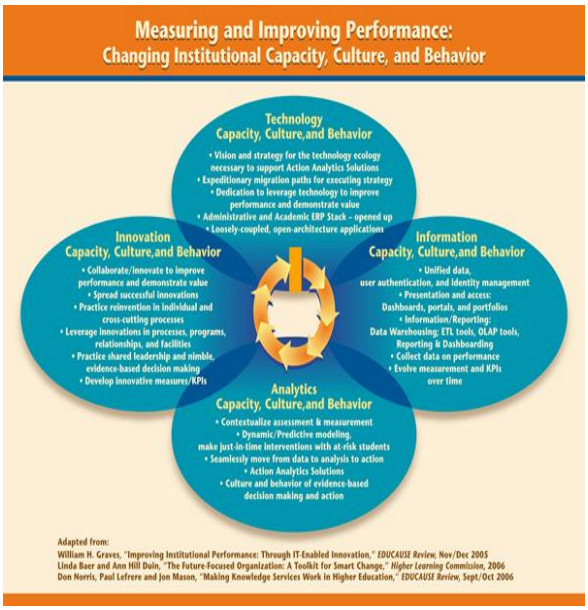

Figure 4. (1.2008) Donald Norris, Linda Baer, Joan Leonard, Louis Pugliese and Paul Lefrer

TECHNOLOGY CAPACITY, CULTURE, AND BEHAVIOR

In an increasingly open-architectural world, institutions will likely choose different long-term strategies for evolving and/or replacing legacy and/or current ERP systems. Many will pursue the strategy of "opening up" existing administrative and academic ERP capabilities and leveraging them with new, open-architecture applications and tools. Optimal action analytics solutions will depend on the right mix of "technology ecology" – a more open, integrated stack and loosely coupled cloud applications. [5]

INFORMATION CAPACITY, CULTURE, AND BEHAVIOR

Many institutions have developed a strategy for eventually providing unified data access, strong identity management, single sign-on, and reporting/information tools. Presentation and access are achieved through some combination of dashboards, portals, and portfolios. As institutions develop their analytics capability, they will achieve new insights into and advances in their reporting capacity. These, in turn, will enable institutions to add new performance measures that better reflect changing times. [6]

ANALYTICS CAPACITY, CULTURE AND BEHAVIOR

A simple measure of an institution's analytics capability is its demonstrated ability to move seamlessly from data to analysis to action. Most US colleges and universities have developed some level of sophisticated analytics capacities to support their business operations. Leading-edge examples of performance analytics typically began with academic analytics focusing on recruiting and retention. Addressing the needs of at-risk learners with dynamic and predictive modelling and with aggressive interventions is also a good initiative to introduce analytics. Performance-based executive dashboards can provide a leverage point as well. But most institutions have a long way to go toward achieving enterprise-wide alignment, greater transparency, sophisticated analyses that trigger actions, and accountability. In the case of the Hungarian model, with sound state interventions into admission processes it will be difficult for universities to fully use analytical capacity. [7]

INNOVATION CAPACITY, CULTURE AND BEHAVIOR

As institutions build their capabilities in technology, information, and analytics, they will become progressively more capable of measuring performance and demonstrating value. However, to genuinely improve performance, institutional leadership will need to commit to greater levels of collaboration and innovation – both inside and outside the campus boundaries. The institution's vision and strategy for building organizational capacity must reflect this commitment. Innovation can begin with individual initiatives, pilot projects, and process reinventions focusing on single-owner activities. Most colleges and universities favor small-scale, individual initiatives and process reinventions, practicing innovation with a lower case "i." To enhance performance in a manner that makes a difference, institutions can use action analytics to justify successful performance-improving innovations being contextualized and replicated across the institution. This can result in enterprise-level innovation – innovation with a capital "I" – capable of supporting an institution that wants to become nimbler than competitors at exploiting opportunities to modify curriculum that can meet customers' needs as they arise. Finally, one of the most important innovations that institutions will undertake is growing their capacity to develop and implement a set of new key performance measures that comport with the needs of learners and employers in the ever-changing world of the twenty-first century. In the case of the Hungarian institutions the innovation as service innovation, or programme innovation and instruction education is mostly missing. KJUC is the only institution in Hungary with declared institutional level instruction methodology.

NEW MEASURES AND KEY PERFORMANCE INDICATORS

The challenge of creating action analytics is complicated by the fact that the performance target is moving – rapidly. Electronic portfolios are growing in acceptance of European and US education, postsecondary, and employer settings and in applications that span these sectors. Future institutional key performance indicators will still focus on access, affordability, and success – but in greater depth, more dynamically, and proactively. Institutions will need to demonstrate their performance on these three measures in comparison with other institutions and learning enterprises. Moreover, these indicators will be part of sophisticated, balanced scorecard and strategy map applications that illustrate the interrelationships

between measures and the actions taken to improve them. The Hungarian AVIR model is using balanced scorecard as the main means for planning, and measuring performance. For individual learners, representations that express the richness of the information and context of their achievements and their potential for success must be enhanced by an order of magnitude. Analytic must be able to demonstrate students' past achievements as well as their capacity for future success in ways that highlight developmental, reflective, and representational information and context. Institutions must also adapt to employers' increasing use of software to identify, validate, and attract talent as fast and as cheaply as possible. Additionally, alumni relationships can and must be fostered by using sophisticated data mining to chart and communicate proven learning pathways throughout active learning lives, cradle through multiple careers. The future world of action analytics will be highly learner-centric. New skills for the global economy begin with a foundation of curiosity, passion, mental flexibility, self-motivation, and psychological mobility. Continuously adapting habits of mind and skills will enable global citizens to play a number of roles directly or through delegation and influence, and institutions have to measure the future workforce capabilities [8]:

Collaborators and orchestrators, who are effective horizontal collaborators able to operate in, mobilize, inspire, and manage a multidimensional and multicultural workforce

Synthesizers, who create unexpected mash-ups with breakthrough results

Explainers, who bring disparate things together and who can turn complexity to simplicity, opening the door to unforeseen synthesizing

Leveragers, who bring together the right people, resources, and/or ideas to maximize and move beyond the current state, making technology and people more effective

Adapters, who bring depth of skills to a progressively widening scope of situations and experiences

"Green" people, who balance sustainability, renewability, and economic growth

Passionate personalizers, who serve a global context in which people require or demand a personal touch, personally delivered services, and customized products

Localizers, who understand the emerging global infrastructure and adapt all the new tools it offers to local needs and demands [9]

PORTABLE PORTFOLIOS OF DEMONSTRATED HABITS OF MIND, SKILLS AND COMPETENCIES

In the evolving workforce environment of the future, the current curricula inadequate for meeting the needs of learners, teachers, parents, and employers. Eventually, portable, transportable, and fungible portfolios for learners will deploy action analytics at a personal level. This could engage learners, teachers, parents, and ultimately employers in meaningful conversations about the skills, capabilities, and habits of mind needed to be successful in the global workforce. Current portfolio initiatives in postsecondary education are largely seen as specialized, departmental solutions to support programmatic accreditation and are confined within the boundaries of the campus. But a few portfolio initiatives that are combining postsecondary and higher education curricula. These initiatives demonstrate how portfolios can be deployed to improve the performance of underserved students, to facilitate transitions between school and work.

NEW KEY PERFORMANCE INDICATORS AND ACTION ANALYTICS: A FUTURE FOCUS

Most academic analytics solutions have looked backward, taking what we know about learners' success to predict behavior in the next semester or to intervene today with at-risk students. But the new generation of students will place a high value on the deployment of forward-looking analytics to help them secure good jobs, and they will focus on their personal near-term and medium-term opportunities.

SUMMARY

Analytics and action analytics is a new model for higher education management. It is based on service science, in the very heart of management there are four components of service science, mainly those, which are connected to service technology and informatics. The model focuses on customers, and gives possibilities for a new generation of customers and partner management.

REFERENCES

[1] Analytics tools provide statistical evaluation of rich data sources to discern patterns that can help individuals at companies, educational institutions, or governments make more informed decisions. In commercial usage, analytics software may evaluate data mined from purchasing records to allow a web-based retailer to suggest products that might interest customers or allow a search engine to target ads based on an individual's location and demographic data. Colleges and universities can harness the power of analytics to develop student recruitment policies, adjust course catalog offerings, determine hiring needs, or make financial decisions. In a teaching and learning context, data from such sources as the learning management system, college application forms, and library records can be used to build *academic* analytics programs that use algorithms to construct predictive models that can identify students at risk for not succeeding academically. Analytics tools provide statistical evaluation of rich data sources to discern patterns that can help individuals at companies, educational institutions, or governments make more informed decisions. In commercial usage, analytics software may evaluate data mined from purchasing records to allow a web-based retailer to suggest products that might interest customers or allow a search engine to target ads based on an individual's location and demographic data. Colleges and universities can harness the power of analytics to develop student recruitment policies, adjust course catalog offerings, determine hiring needs, or make financial decisions. In a teaching and learning context, data from such sources as the learning management system, college application forms, and library records can be used to build *academic* analytics programs that use algorithms to construct predictive models that can

identify students at risk for not succeeding academically. http://net.educause.edu/ir/library/pdf/ELI7059.pdf
date of download: 5. Nov. 2010.

[2] Goldstein, Philip J. with Richard N. Katz, "Academic Analytics: The Uses of Management Information & Technology in Higher Education", ECAR Research Study Volume 8, 2005
(date of download 5. Nov. 2010. http://net.educause.edu/ir/library/pdf/ers0508/rs/ers0508w.pdf)

[3] Norris, Donald, Linda Baer, Joan Leonard, Louis Pugliese, and Paul Lefrere "Framing Action Analytics and Putting Them to Work", *EDUCAUSE Review*, Volume 43, Number 1, January/February 2008.

[4] Oblinger, Diana G. and John P. Campbell, "Academic Analytics" EDUCAUSE White Paper, October 2007.

[5] Software solutions for higher education
http://www.scientia.com/uk/
(date of download 5. Nov. 2010.)

[6] There are a lot of consulting firms with higher education consulting: http://www.scannellkurz.com/our_services.asp
(date of download 5. Nov. 2010.)

[7] Re-Visioning Career Services for a New Economy. http://www.eduventures.com/
(date of download 5. Nov. 2010.)

[8] Systemic Management Solutions (date of download: 5. Nov. 2010.: http://www.systemiccoaching.com/)

[9] http://www.google.com/analytics/
http://www.knowledgeadvisors.com/
(date of download: 5. Nov. 2010.)

BIBLIOGRAPHY

[1] (2008) Donald Norris, Linda Baer, Joan Leonard, Louis Pugliese and Paul Lefrere: Action Analytics: Measuring and Improving Performance that Matters in Higher Education. *EDUCAUSE Review*, vol. 43, no. 1 (January /February 2008): pp. 42–67.

[2] (A)VIR kézikönyv. http://www.felvi.hu/felsooktatasimuhely/avir/kiadvanyok/kezikonyv