



RESEARCH PAPERS IN ECONOMICS AND FINANCE

JOURNAL HOMEPAGE: www.ref.ue.poznan.pl

Development of the educational environment through the formation of Private Corporate Universities

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ABSTRACT

This article aims to analyse the experience of creating and functioning of corporate universities as a way of developing an educational environment – a component of corporate social responsibility (CSR) and an essential element of social infrastructure. This article lists the possible benefits of interaction between an individual, a corporate university and a region in the co-operation based on continuous development and education. The methodology of the narrative literature review is applied in order to achieve the above aim.

Keywords: educational environment, corporate social responsibility, social infrastructure, individual human needs, corporate university, continuous development.

1. Introduction

Corporate social responsibility that allows finding a consensus between the commercial interests of corporations and the expectations of society is a new civilisational stage in the development of society and business [Kolot, 2012]. According to this concept, enterprises should make decisions based not only on financial or economic factors but also on social, environmental and other consequences of their activities. Stakeholders of companies realise that business development is possible only with social development, and social development is possible only with business development.

The concept of CSR in companies of different levels and various spheres of business can include different components: health care, labour protection, environmental protection, human rights, fighting corruption [Abe and Ruanglikhitkul, 2012]. However, the ever-changing technologies and the uncertainty of the modern environment lead to the fact that the companies activities depend on the level of em-

ployees' development and ability to adapt to turbulent conditions. In this connection, such components as human resources management and the educational environment considered as space in which the process of personal development is taking place are becoming increasingly critical.

2. Literature review

Corporate social responsibility has been researched extensively in Western Europe [Steurer and Konrad, 2009], and to some extent in Central and Eastern Europe [e.g. Furrer, Egri, Ralston, Danis, Reynaud, Naoumova, Molteni, Starkus, Darder, Dabic, Furrer-Perrinjaquet, 2010], as well as in the countries of the former USSR [e.g. Kolot, 2012, Kurinko, 2011, etc.]. Problems of an institutional design of the intellectual capital of corporations, providing their competitiveness, are presented in the works of Johnson and Daron [2005], Knack and Keefer [1995], Pająk, Kamińska and Kvilinskyi [2016],

Udovichenko [2007], etc. The issues of development of business education systems were discussed in details in the works of such foreign researchers as Blass [2001], Drucker [1997], Meister [1998], Patterson [1998], Walton and Martin [2000]. Problems of formation and development of human capital, determined in the development of business education, are presented in the works of Balychin, Safaraliev and Berdashkevich [2011], Belolipetsky [2006], Kvilinskyi, Mieshkov and Bondaryeva [2017], Mieshkov, Kravchenko, Bondaryeva and Kvilinskyi [2017], Pietrykowski [2001], Huitt [2007] etc. There is considerable interest in this problem both in literature and in practice. On the one hand, it shows the relevance of the problem, but on the other hand, it demonstrates the lack of sufficient systematisation and generalisation of theoretical material, which requires further research.

3. Methodological

This article aims to analyse the experience of creating and functioning of corporate universities, as a way of developing an educational environment – a component of corporate social responsibility (CSR) and an essential element of social infrastructure. To achieve the aim of the study, the author critically analysed a selection of literature on the subject. However, applying for a narrative literature review as the only method of data collection and analysis should be considered as the limitation of the study.

The paper begins with a theoretical review of the issues related to the role of private corporate universities in the development of the educational environment as an essential element of social infrastructure and a component of corporate social responsibility. Then, the approaches to the definition of the corporate university are determined, and the process of building a corporate university for the company is analysed. Further, the possible benefits of interaction between an individual, a corporate university and a region in the co-operation based on continuous development and education are discussed.

4. Research results

4.1. The role of developing private sector educational services

Even though education is an essential component of the social infrastructure of society, which has a vital role in the socialisation and

development of individuals, significant changes are currently taking place in higher education. Nowadays, universities have lost their monopoly power in knowledge. In addition to the widespread inadequacy of the source of knowledge (professors) and the form of education (lectures), a firm diagnosis – “long, inefficient, expensive” [Anders, 2012], can be put to the modern education system represented by traditional (conservative) universities. In other words, it is not adequate for the price, the terms and the quality.

On the other hand, business recognises the potential opportunities and tries to master a new educational trend. Thus, the 2Tor start-up gathered \$90 million from venture investors, and venture capitalists from Charles River Ventures invested \$5 million in the Udacity start-up [Balatsky 2015]. In this way, business diversification is a significant factor in social infrastructure development.

At the same time, many countries show rather low levels of innovation and high-tech products on the market. The task of overcoming the technological gap could be done only in case of ensuring the effective integration of education, science and industry [Sanderatne, 2011]. According to McKinsey's research, public entities around the world need more than \$8 trillion to fund social infrastructure projects by 2020. This figure exceeds the capital requirements of the oil and gas and mining industries combined. More than 40% of the \$8 trillion is required for the creation of social infrastructure in developing countries. With public finances tighter than ever, expectations for public-private partnerships (PPPs) are growing. While private sector interest in the financing of infrastructure projects has increased in recent years, barriers to private sector involvement remain. Many government agencies do not have the capacity and capabilities for the planning, execution and management of PPP projects [McKinsey & Company]. At the same time, the performance of educational processes needs improvement. Managing this complexity can be a hard task even for developed countries.

The integration of scientific, industrial and educational activities could be implemented on a platform of specialised schools. They are designed for intensive training to enable people to work in a specific branch or a particular company. The requirements of the dynamically developing business are so high that the external market is just unable to provide the inflow of necessary specialists for each company [Gerbman, 2000]. Nowadays, many organisations reached a new level of training of qualified per-

sonnel and established their educational institutions (departments) for staff development. International experience in the field of professional education suggests that one of the most effective ways to solve this problem is creating a company's corporate university.

Defining the concept of a corporate university, the majority of experts tend to call a corporate university as the existing in the company's forms of training, the in-house staff training system. At the same time, there is more than a narrow understanding of a corporate university as a system of training young professionals in specialised universities [Walton, Martin, 2000]. They are trained by a specially designed training program, which takes into account the specifics and the corporate culture of the company. Herewith the supporters of this concept do not exclude the university's function of in-house staff training at various levels.

U.S. companies use the term 'university' for the name of a department for personal training and development without any restraint. In Europe, the term 'university' is used with restraint, only with reference to higher education. Among 30 corporate universities operating in Europe, only 14 are known as 'universities', five are called 'centres', four use the name 'institute', 3 – 'academy' and one is called a 'business school'. While using the term 'university', European companies explain it in their way. For example, Daimler Chrysler (Germany) presents a corporate university as "the place for the exchange of knowledge and competence" [Allen, 2002]. Heineken (Netherlands) describes a corporate university as a "link between knowledge transfer and creation" [Allen, 2002]. The term 'university' in this case is used carefully as it implies a certain institutional and functional addictiveness.

According to the Ukrainian legislation:

"University is a multidisciplinary higher education institution of the fourth accreditation level, which carries out educational activities related to obtaining certain higher education and wide range qualifications in natural, human, technical, technology, culture art, economic and other areas of science. It carries out fundamental and applied researches, is the leading scientific and methodical centre with a developed infrastructure of educational, scientific and industrial divisions, and appropriate level of staffing and logistical support, contributing to the spread of scientific knowledge and carrying out cultural and educational activities" [The Law of Ukraine on Higher Education, 2014].

According to the analysis of legislation, the existing legal framework does not provide such a type of educational institution as a corporate university.

The experts pay attention to the specific characteristics of education in corporate universities. First of all, it refers to the fact that education (its content and form) is aimed at a specific target group, i.e. employees of a company or an industry. Another essential feature is the presence of a single company's development strategy and the corresponding concept of staff development of the company. A further feature is that a corporate university is a system that allows people to improve their skills regularly through training, coaching and traineeship. Thus, a corporate university provides continuous professional education in the lifelong learning concept. Finally, the function of a corporate university is the intellectual component, which allows being engaged in strategic research, to determine the company's strategy [Udovichenko, 2006]. Therefore, despite some differences in the definition of the corporate university, almost all experts agree that a corporate university is a system of in-firm training, combined in a single concept within the strategy of the organisation's development and applied to all staff levels.

From the determined meaning of a corporate university, education there is an interesting consequence: the current system of professional higher education cannot and does not have to reproduce in full the corporate university functions. The higher professional education system should prepare graduates, who are oriented to work in any corporation. On the other hand, the existence of competition leads to the constant appearance of new forms and methods for solving practical problems, knowledge of which would be very useful for future graduates [Walton, Martin, 2004]. Thus, there is a mutual influence of corporate education on the system of higher education and vice versa. This effect manifests itself in the formation of professionals and other requirements for graduates by employers (corporations).

Today, real requirements for graduates cannot be determined by any corporation, as the goals and objectives of corporate entities differ from one another, even in the same industry. Thus, to entrust to companies the formation of professional and other requirements for graduates means to consider only private interests that will prevail over the general one. It is necessary to develop employees' specific skills in the private educational institutions or the companies itself.

Corporate education is an integral part of business, so it should make real direct/indirect economic effects. Corporate education should be cost-effective, and therefore, use easily replicable educational technologies, with minimum disruption of staff from production responsibilities and minimising the costs of the implementation of educational programs.

4.2. Creating and commercialising corporate university

In the modern understanding, a corporate university is a system of staff training and development within the company, in connection with the strategy of the organisation development [Balatsky, 2015]. Indeed, each industry has its specifics; however, the majority of learning centres and corporate universities use similar forms and methods of training:

- thematic training, master classes and workshops,
- professional development courses,
- projects, lectures, group work, case studies solution,
- gamification,
- e-learning covers all levels of employees and various geographical locations.

The main reason that encourages companies to invest millions into the creation of corporate universities is ensuring sustainable development of employees at a single training standard. A pioneer in creating a corporate training centre was McDonald's. Its famous Hamburgers University was opened in 1961, but it took six more years to realise a critical thing: ensuring the same quality of service in the city centre, as well as in the outskirts of small towns, is possible only if all employees are trained at the same standard. For other countries, it took another 30 years to come up to this conclusion. The boom for creating corporate universities was observed in the 1990s [Hearn, 2001; Meister, 1998]. Such companies as General Electric, Motorola, Coca-Cola, Procter&Gamble continue to set trends in the corporate training development.

Thus, creating an internal corporate university, a company solves its needs to increase business efficiency and support the development of its employees. However, this is not the only option of functioning corporate universities. It could have an open form and provide training services and expertise to external clients, companies and businesses. The economic crises of the mid-1990s forced experts of corporate training centres to search for ways to survive. One of the most fruitful ideas turned out to be

a transition to self-sufficiency. One of the first companies which gave its corporate university the status of a separate business unit was the Motorola company. Moreover, Motorola U (university) began to teach not only the internal customers (employees) but external individuals as well. Eventually, leaders in the commercialisation of corporate training were IT companies [Hearn, 2001]. Providing customers with IT products, they offered to train their employees, so that corporate users in the future would be able to self-serve and modify complex IT products.

Transformation of corporate universities in an open mode of training and consulting centres is a serious project that requires significant investment at the initial stage. Such an important decision requires a balanced risk analysis and calculation of long-term consequences. Nowadays, the market offers a range of various corporate university models [Belolipetsky, 2006]: based on the objectives, directions, budgets and organisational forms (a non-profit educational institution and its subsidiaries, a company's branch or its structural subdivision, department or division and so on).

Creating an active learning centre is a costly project, which may amount to 15-60% of the staff budget [Kvilinskyi, Mieshkov and Bondaryeva, 2017]. Therefore, it is necessary to assess whether a corporate university is required at this stage of the company's development. Additionally, proceeding with such a project, there is a need to understand that the return of investments will start with a considerable delay of about one year after launching a corporate university.

The first step in creating a corporate university is conducting an audit of the existing system of personal training. Auditing can be performed with the use of the following analytical procedures [Meister, 1998]:

- evaluation of training objectives;
- assessment of implemented learning concepts;
- assessment of the current organisational structure of training;
- evaluation of teaching methods;
- evaluation of the learning quality control systems;
- evaluation of the effectiveness of training;
- evaluation of existing corporate training and development budget.

Carrying out such an audit is necessary to obtain a comprehensive understanding of the processes related to the training and development of staff implemented in the company. Business objectives can change, and therefore the

activity of a corporate university should be able to change its direction. Accordingly, the work of a corporate university has to be flexible and responsive to business objectives. All this brings us to the necessity of developing the concept of corporate training and staff development. The purpose of this step is to establish relevant principles and elements of a corporate system of training and staff development. At this step, it is important to develop not only a target concept but also the stages and principles of the learning system reorganisation from the current format to the format defined in the concept. It is essential to identify the resources needed for carrying out the changes, namely the budget of the project and the project team.

The next step in creating a corporate training centre is to develop competency profiles of key positions and levels. It is critical to integrate the competence assessment procedure to the staff development program. Only then, a company can form and choose teaching methods that would satisfy the need for the development of critical competencies. There are many formats of training and development. To improve the efficiency of a corporate university, the entire arsenal of existing formats of learning should be used. Selection of the teaching format has to be applied to a particular module and goals. It is necessary to create and approve the schedule of the training activities implementation.

Finally, one of the most critical stages for the success of establishing a corporate university is the development of a methodology for assessing its effectiveness. The evaluation cri-

teria may be, for example, the following:

- an increase in sales and revenue;
- reducing costs by standardising management processes (management of knowledge, staff, changes);
- improved customer satisfaction;
- improving the quality of products and services;
- optimisation of the cycle of order execution;
- reduction of waste;
- improved safety performance;
- increasing employee satisfaction;
- reducing staff turnover.

The implementation of the indicators above enables a company to understand what positive effects are generated by corporate training. The steps for creating a corporate university are summarised in Table 1.

The introduction of a corporate university to the external market as an independent provider of educational services requires much effort. It is necessary to consider all the advantages and disadvantages carefully. It is advisable to launch training for external clients when [Walton, Martin, 2004]:

- the primary goal of a corporate university is achieved (staff training and development at all levels is established, unified and standardised),
- all processes are digitised, and key performance indicators (KPIs) are established,
- the effectiveness of the staff training is proved in practice,
- corporate training programs provide the necessary knowledge and skills relevant to the needs of individual departments and the whole company.

Table 1: The process of creating a corporate university

Steps	Tasks
Assessment of existing training and development system	<ul style="list-style-type: none"> - To understand whether: - the need for training staff cannot be satisfied by existing educational institutions - employees need specific skills that require regular training
Development of the concept and the corporate university strategy	<ul style="list-style-type: none"> - to create a mission, vision of the future knowledge centre (based on analysis of the information obtained in the first stage) - to form a project team - to develop and justify the business plan for a corporate university
Development of the methodology of training, trainers education	<ul style="list-style-type: none"> - to create training programs (in line with the company's strategy, key positions profiles and competencies) - to standardise learning processes
Development and implementation of performance criteria	<ul style="list-style-type: none"> - to define the success criteria, key performance indicators - to provide the continuous monitoring of performance and effectiveness of a corporate university

Source: compiled by the author on the basis of Allen [2002]; Heckscher and Adler [2006]; Udovichenko [2006].

4.3 The benefits of creating corporate universities

To summarise what has already been mentioned, as well as to highlight the feasibility of operation of a corporate university, it is reasonable to combine and compare benefits of a given region, the company (which establishes a corporate university), as well as a specific individual who is potentially trained in the corporate university (Table 2).

It is worth emphasising the trends in corporate education development within the social infrastructure of a region. The primary trend in corporate universities performance nowadays is their quantity growth and going mass-scale. At present, there are more than 3000 corporate universities and their rapid growth continues [Gerbman, 2000].

Table 2: Assessment of market attractiveness and growth potential

Region interests	Company interests	Individual interests
<ul style="list-style-type: none"> - development of scientific and technical progress - improving the quality of educational services - private investments in social infrastructure 	<ul style="list-style-type: none"> - a solution of the conflict between quality of education and business requirements - targeted training of employees at the same standards - increasing the efficiency of employees, and business efficiency therefore 	<ul style="list-style-type: none"> - satisfying the needs in education and development - the possibility of sustainable development - socialisation in a possible new circle - an opportunity to show yourself as a trainer

Source: compiled by the author on the basis of Blass [2001]; Walton and Martin [2004].

Through the cooperation of a corporate university with leading universities in a region, a staff training system is formed. The forms of such cooperation may vary from the participation of students in the internships at companies to establishment of specialised educational and research departments at universities, financed by corporations. At the same time it is possible for a corporate university to select talented students with the use of corporate grants, as well as exciting and promising work.

The next trend in the cooperation of educational institutions of the social infrastructure is the participation of a corporate university in the development of the professional and educational standards for different specialities. Leading companies are already involved in this process, working with the government to develop such standards.

Another trend is related to the need for a more dynamic update of educational programs content. Experience shows that the dynamics of teaching materials renovation in corporate universities is much higher than in traditional universities. It should be noted that this trend sharply tightens the requirements for the teaching staff of corporate universities and traditional educational institutions.

What should be taken into consideration is another feature of the development of corporate universities, namely the development of both professional and 'soft' skills. Their range may include training of personal growth, self-de-

velopment, leadership and team building, performance and organisation, systematisation, creativity and public speaking skills, etc. Building an enterprise knowledge accumulation system is necessary.

Finally, the latest trend is cooperation between corporate universities in the development of educational methods. This is especially important for the leading industries of the region. Today it is essential for corporate universities to express a united opinion on teaching and staff development. This cooperation will make it possible to improve the system of training in companies, to solve common systemic issues, to create conditions for the free exchange of experiences.

5. Conclusions

A higher level of economic development could be achieved through the development of social infrastructure. Many a time it will require significant investments, including substantial resources for educational development. The intensification of CSR practices through the creation of private corporate universities is one of the possible ways to promote the development of an educational environment for life-long education. This satisfies three essential needs: skilled workers for the companies, spiritual and cultural development for individuals and one way of solving the main tasks of social infrastructure.

The paper contributes to the discussion on the development of the educational environment (regarding material systematisation and generalisation) and could be useful for stake-

holders and managers of companies (as regards increasing the degree of management of decisions validity).

References

- Allen, M., 2002, *The Corporate University Handbook: Designing, Managing, and Growing a Successful Program*, American Management Association, New York.
- Abe, M., Ruangkhitkul, W., 2012, *Developments in the Concept of Corporate Social Responsibility (CSR)*. Retrieved from http://www.unescap.org/sites/default/files/6%20-%20Chapter%20II_Developments%20in%20the%20concept%20of%20CSR.pdf (accessed 27 December 2017).
- Anders, J., 2012, *Vysshee obrazovanie za \$100 [Higher Education for \$100]*, Forbes.ua. Retrieved from <http://forbes.ua/magazine/forbes/1336363-vysshee-obrazovanie-za-100> (accessed 30 May 2015).
- Balatsky, E., 2015, *New Trends in the Development of the University Sector*, Mir Rossii, Vol. 24, No. 4, 72-98.
- Balychin, G.A., Safaraliev, G.K., Berdashkevich, A.P., 2011, *Concept of Continuing Education in the Russian Federation: Goals, Peculiarities of Legal Regulation and Management*, Herald of the RSUH, Vol. 66, No. 4, 9-28.
- Belolipetsky, V.G., 2006, *Entrepreneurial Constant in the Reproduction of Economic Systems*, Bulletin of Moscow University: Economy, No 3. 8-9.
- Blass, E., 2001, *What's in a Name? A Comparative Study of the Traditional Public University and the Corporate University*, Human Resource Development International, Vol. 4, Issue 2, 153-173.
- Drucker, P., 1997, *The Future That Has Already Happened*, Harvard Business Review, September-October, 20-22.
- Furrer, O., Egri, C.P., Ralston, D.A., Danis, W.M., Reynaud, E., Naoumova, I., Molteni, M., Starkus, A., Darder, F.L. N., Dabic, M., Furrer-Perrinjaquet, A., 2010, *Attitudes Toward Corporate Responsibilities in Western Europe and in Central and East Europe*, Management International Review, Vol. 50, Issue 3, 379-398.
- Gerbman, R., 2000, *Corporate universities can augment training programs and teach employees strategic lessons*. Retrieved from <https://www.shrm.org/hr-today/news/hr-magazine/pages/0200gerbman.aspx> (accessed 27 December 2017).
- Hearn, D.R., 2001, *Education in the Workplace: An Examination of Corporate University Models*. Retrieved from <http://newfoundations.com/OrgTheory/Hearn721.html> (accessed 27 December 2017).
- Heckscher, C., Adler, P.S., 2006, *The Firm as a Collaborative Community: Reconstructing Trust in the Knowledge Economy*, Oxford University Press, New York.
- Huitt, W.G., 2007, *Maslow's Hierarchy of Needs: Educational Psychology Interactive*. Retrieved from <http://edpsycinteractive.org/topics/regsys/maslow.html> (accessed 27 December 2017).
- Johnson, S., Daron, A., 2005, *Unbundling Institutions*, Journal of Political Economy, Vol. 113, No. 5, 949-995.
- Knack, S., Keefer, P., 1995, *Institutions and Economic Performance: Cross-Country Tests Using Alternative Institutional Measures*, Economics and Politics, Vol. 7, Issue 3, 207-227.
- Kolot, A.M., 2012, *Social Responsibility: Development of Theory and Practice*, KNEU, Kyiv.
- Kurinko, R., 2011, *Implementing CSR: Simply about Complicated*, Raduga, Kyiv.
- Kvilinskyi, O., Mieshkov, A., Bondaryeva, I., 2017, *Investigation of the Social Factors of Development of Society in the Territories with Transforming Environment*, Research Papers in Economics and Finance, Vol. 2, No. 2, 13-19. <https://doi.org/10.18559/ref.2017.2.2>
- McKinsey&Company, *Social Infrastructure. Helping clients optimize the quality of social infrastructure projects while minimizing costs and keeping projects on schedule*. Retrieved from <https://www.mckinsey.com/industries/capital-projects-and-infrastructure/how-we-help-clients/social-infrastructure> (accessed 27 December 2017).
- Meister, J.C., 1998, *Corporate Universities: Lessons in Building a World-class Work Force*, McGraw-Hill, New York.

- Mieshkov, A., Kravchenko, S., Bondaryeva, I., Kvilinskyi, O., 2017, *Modern Features of Satisfying the Needs of the Labor Market in Specialists in the Financial Sphere with In-Depth Knowledge of Investment and Innovation*, European Cooperation, Vol. 22, No. 3, 19-32.
- Pająk, K., Kamińska, B., & Kvilinskyi, O., 2016, *Modern trends of financial sector development under the virtual regionalization conditions. Financial and credit activity: problems of theory and practice*, 2(21), 204-217. <https://doi.org/10.18371/fcaptp.v2i21.91052>
- Patterson, T., 1998, *Corporate Education and Training for Adult Learners: A Comparative Study of Two Corporate Education Models*, University of California, Davis.
- Pietrykowski, B., 2001, *Information Technology and Commercialization of Knowledge: Corporate universities and class dynamics in an era of technological restructuring*, Journal of Economic Issues, Vol. 35, Issue 2, 299-306.
- Sanderatne, N., 2011, *Investing in Social Infrastructure: Education and Technical Skills. Imperatives of Economic Eevelopment*, Sunday Times. Retrieved from <http://sundaytimes.lk/110327/Columns/eco.html> (accessed 27 December 2017).
- Steurer, R., Konrad, A., 2009, *Business-Society Relations in Central-Eastern and Western Europe: How Those Who Lead in Sustainability Reporting Bridge the Gap in Corporate (Social) Responsibility*, Scandinavian Journal of Management, Vol. 25, Issue 1, 23-36.
- The Law of Ukraine, 2014, *On Higher Education No. 1556-VII*. Retrieved from http://search.ligazakon.ua/l_doc2.nsf/link1/T141556.html (accessed 27 December 2017).
- Udovichenko, M., 2006, *From Organization of Education to Educational Organization*, Corporate University, No. 1, 9-13.
- Udovichenko, M., 2007, *Building the System of Learning Efficiency Management*, Corporate University, No. 6, 14-18.
- Walton, J.S., Martin, M.C., 2004, *Corporate Universities vs Traditional Universities: Comparison through Published Organisation Documentation*, in: Egan, T.M., Moris, M.L., Inbakumar, V. (Eds.), Proceedings AHRD 2004 Conference, Academy of Human Resource Development, Bowling Green, pp. 10-17. Retrieved from <http://files.eric.ed.gov/fulltext/ED491482.pdf> (accessed 27 December 2017).
- Walton, J.S., Martin, M.C., 2000, *The Impact of the Corporate University – Case Study Analysis of Developments in the UK*, in: Kuchinke, P.K. (Ed.), Academy of Human Resource Development Conference Proceedings, Academy of Human Resource Development, Baton Rouge, pp. 941-948. Retrieved from <https://files.eric.ed.gov/fulltext/ED441084.pdf> (accessed 27 December 2017).