

Personalising teaching and learning experience of built environment students in large groups

Poorang PIROOZFAR, a.e.piroozfar@brighton.ac.uk

@BEACON, School of Environment and Technology, University of Brighton, Cockcroft Building, Brighton, BN2 4GJ, East Sussex, UK

Kemi ADEYEYE, o.adeyeye@brighton.ac.uk

@BEACON, School of Environment and Technology, University of Brighton, Cockcroft Building, Brighton, BN2 4GJ, East Sussex, UK

Abstract

One of the persistent problems in the higher education sector is the perpetual predicament of teaching students in large groups. Despite passing over the mass production paradigm in manufacture and service industries, higher education has not yet been quite successful in leaving this paradigm behind. Although theoretically the structure of higher education sector has undergone fundamental changes and the technological advancements support every movement in right directions, there are yet practical problems to overcome on this way. Teaching students in large groups as far as vocational courses are concerned becomes a very critical task and highly prone to disastrous failure, if the practical applications of the taught subjects are not fully taken into account. The problem is even more conspicuous where the concerned group is a blend of students on different courses with allegedly different sets of expectations, preferences, priorities, needs, and wants. Added to these complexities are the learning styles of the individual students.

Funded by the Centre for Learning and Teaching, University of Brighton, this research project was designed to gauge the needs and the practical possibilities for personalised learning and teaching logs for individual learners in large groups.

The paper reports on partial findings of the research project. It first of all introduces the concept of customisation and personalisation in their context of origin. Then the critical review is expanded to the application of personalisation in learning and teaching environments by highlighting the individual elements in customisation of education. Setting out the module context, the paper then introduces an industry standard test of learning styles to cross-reference the individual preferences with what in particular is required for each course from the students' point of view. It finally concludes with some practical suggestions as well as some executive level recommendations to more efficiently plan, allocate resources, and carry out teaching large groups for achieving higher satisfaction levels.

Keywords: Teaching large groups, Customised teaching, Personalised learning experience, Learning styles

1. Introduction

One of the persistent problems in the higher education sector is the perpetual predicament of teaching students in large groups. The problem arises as a result of limitation on resources – financial, staff time, and space – and can be exacerbated by variation of demography of the students on a course or a module across different courses. However, this problem is not limited to this level of application and expands all the up the systemic organisation in higher education.

Higher education forms a vast part of service industry. It shares many of the common characteristics of this sector yet refuses to lend itself fully and completely to the mainstream features shared between other major members of the service sector. Despite passing over the mass production paradigm in manufacture and service industries, higher education has not yet been quite successful in leaving this paradigm behind. Although theoretically the structure of higher education sector has undergone fundamental changes and the technological advancements support every movement in right directions, there are yet practical problems to overcome on this way.

Teaching students in large groups has always been a challenge in its own in terms of managing the class, keeping the pace of teaching and learning and ensuring a satisfactory level of engagement of the students. This will be added by some additional concerns when teaching in vocational courses is under focus. As far as vocational courses are concerned, teaching large groups becomes a very critical task and highly prone to disastrous failure, if the practical applications of the taught subjects are not fully taken into account.

The problem of teaching large groups is even more conspicuous where the concerned group is a blend of students on different courses with allegedly different sets of expectations, preferences, priorities, needs, and wants. Added to these complexities are the learning styles of the individual students, ethnic backgrounds which is reflected in individual understandings of higher education, its application and the relationship and tasks of the tutor's and the student's.

With a very basic epistemological analogy between the higher education and other service industries, and between the involving variables in this problem on either side, an ultimate solution to this problem would be mass customisation of learning and teaching. This shows a promising shift in higher education towards offering a more efficient service on the service provider's side as well as a better value for money on the customer's side, but like any new approach comes with its own challenges and problems.

2. Review of existing literature

2.1 Mass customisation and personalisation

Customisation was first coined by Stan Davis in 1987. In a chronicle of the production paradigms it succeeds mass production. However, as a paradigm it advocates combining craft production with

mass production, guaranteeing to maximise benefits of both (See Pine 1993; Pine and Gilmore 2000; Reichwald and Piller 2002; Tseng and Jiao 2001; Tu *et al.* 2001, among the others). A general overarching definition of mass customisation can be ‘offering individually customised products and services at a mass scale’, which in a more sophisticated form means, ‘meeting each customer’s individual wants and needs at a cost comparable to mass produced goods or services’ (Da Silveira *et al.* 2001; Huang *et al.* 2008; Liu *et al.* 2006; McCarthy 2004; Pine 1993; Piroozfar 2008).

Despite many systemic evolutions and, strategy and application advancements during the recent years many researchers believe that customisation still remains intact as a ‘strategy to create value by some form of company - customer interaction at fabrication/assembly stages to create customised products with production cost similar to those of mass produced products’ (Kaplan and Haenlein 2006). Some others such as Vesanen and Raulas (2006), on the other hand, subscribe to the idea that customisation is an element of personalisation. With no intention to argue for or against one or the other, in this research we also build our discussion upon the idea that personalisation has different phases i.e. ‘customer interactions’, ‘analyses of customer data’, ‘customisation based on customer profiles’, and ‘targeting of marketing activities’; and that they are interlinked.

2.2 Mass Customisation and Personalisation in Education

Although it can be argued that education is no exception from other service industries in application of what was declared as a paradigm shift by Pine (1993), there is very little evidence to support the application of mass customisation in education. There is research which demonstrates the application of customisation in the higher education (Fried 2008; Gabriel *et al.* 2007; Mulder 2005; Nistor *et al.* 2010; Waslander 2007), but there is still need for more systemic research in this area. Mass customisation in education allows catering for the student’s individual needs, skills and interests. Rippel *et al.* (2009) believe that not only does this lead to a higher motivation for the students but it also facilitates a better and holistic individual education and deep learning. Nistor *et al.* (2010) suggests that the implementation of mass customisation in teaching and training requires a view of the production cycle.

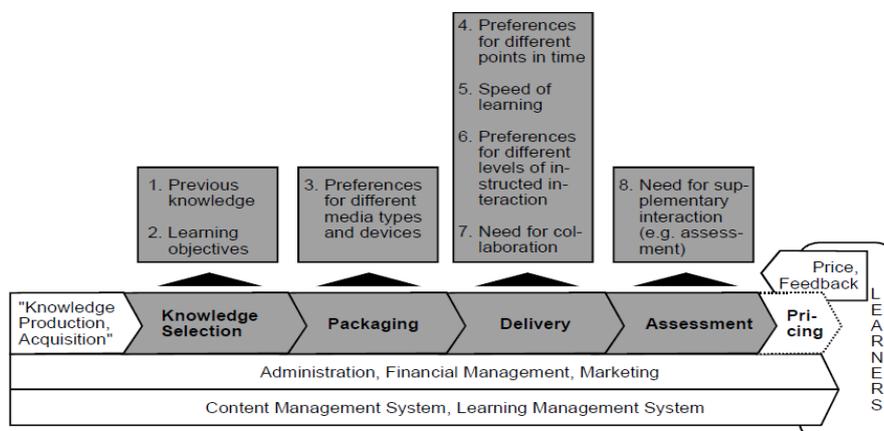


Figure 1: Customisation along the Education Value Chain (Hutzschenreuter 2002)

With a 'production value chain' concept in mind Hutzschenreuter (2002) declares that there are different areas along the education value chain around which customisation can take place (Figure 1).

3. Module context

The selected module for this study is BE135: IT and Study Skills. It is a first year module and is worth 20 credits. It is delivered over an academic year consisting of two semesters in the School of Environment and Technology, University of Brighton. The target audience is formed of foundation (FdSc) and BSc students in architectural technology, building surveying, construction and project management. There were 123 students enrolled for the module in 2010-2011 academic year.

The module consists of two different parts; IT and study skills. The study skills cover personal and soft skills including effective strategies for academic reading, time management, presentation skills, preparation for exams, etc. The IT covers IT skills for academic and professional development. Academic IT skills consist of what the students need for their academic studies in university such as online data mining, use of library and archive resources as well as preparing reports and referencing using relevant software packages. The professional skills concentrate on a professional, industry standard CADD (Computer Aided Drafting and Design) package (Autodesk AutoCAD) and an environmental assessment software package (IES).

This study aims to gauge teaching and learning of the CADD package. However, from time to time, the findings and results of this study are overshadowed by the other elements of this module as the understanding, at some particular points, was that this is an assessment of the module. For the content coverage of the module, the number of students and limitations on space, resources and staff, the CADD is delivered to three groups of 35-45 students in two-hour workshops every other week (the workshops alternate between IT and study skills every week) totalling 8 CADD workshops altogether. The assessment is formed of class assignments as well as two coursework, one at the end of semester one and the other at the end of semester two.

4. Methodology

Coffield *et al.* (2004a, 2004b) identify five families of learning styles and evaluate in detail 13, as per their account, influential models, looking at both studies where researchers have evaluated the underlying theory of a model in order to refine it and empirical studies of reliability, validity and pedagogical impact.

For this study Index for Learning Styles (ILS) was selected to map the learning styles of the first year built environment students at the beginning of the academic session. ILS was deemed a practicable and worthwhile tool for this study because it is an open access on-line tool for evaluation of four dimensions of learning style, i.e. active/reflective, sensing/intuitive, visual/verbal, and sequential/global. The other reason for this selection was that the model, which was formulated by

Richard M. Felder and Linda K. Silverman of North Carolina State University, aims to assess teaching and learning in engineering education.

The online survey was set and used for preparing and analysis of the pre- and post-module questionnaires. Participation in the surveys was voluntarily, anonymous, and confidential. There was no assessment element attributed to any of the questionnaires or the additional experiments. The pre- and post-module questionnaires were designed to monitor students' understanding, expectations, needs and requirements before they experienced this module and after that. It was expected however, that with no actual personalised element structured in the delivery of this module, both pre- and post-module questionnaires call for such a necessity. The method used for this part of research chiefly relied on pure quantitative methods while the additional learning and teaching experiment which meant to monitor the effectiveness of individually tailored solutions for different types of learners, was mostly based on qualitative methods, although it also used a questionnaire at the end of each experiment. The additional experiment was designed with careful considerations about limitation on resources and staff time and workload and was meant to use an approach comparable to Duray *et al.*'s 'Assemblers' model with the least possible increase in face-to-face contact time with students (2000).

This paper will present partial findings of the quantitative study. The findings of the qualitative section will be discussed separately later.

5. Findings

Two questionnaires were designed and surveys were conducted at the beginning and end of the module. The findings from these surveys are discussed in the following sections. A total of 86 responses were received for the first survey, compared to 46 for the post-module survey. There were a total of 123 students enrolled on the module.

5.1 General

Early on in the study, it was important to establish the general profile of the sample population. In general, 94% of the students are undertaking an undergraduate degree for the first time, while the remainder held a previous degree on a non-related subject.

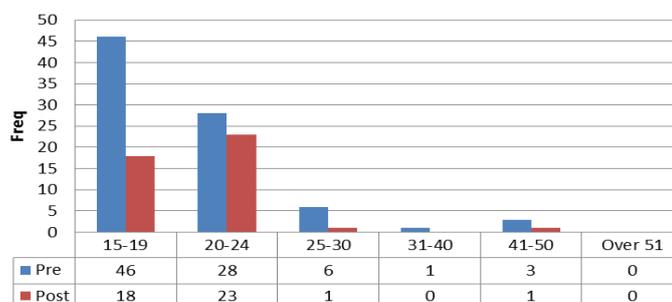


Figure 2: Age groups of the students enrolled in BE135

Starting with the age group represented in the responses; the age profile of the responding students was representative of the ages represented in the entire population; students registered on the module. Most of the students are aged 15-24 years old. 55% of responding students were aged 15-19 years old in the pre-module questionnaire, compared to 42% at the post-module survey. 33% were aged 20-24 years old at the pre-module study compared to 54% in the second survey. A small minority are aged 25 and above (see Figure 2).

Numerically, more FdSc students engaged with the study compared to the other courses represented in the module. Fewer students completed the post-module questionnaire compared to the pre-module survey. However, participating in the study was not a compulsory requirement.

A cohort of 120 to 140 forms the class size in this module each year. There are some lectures on use of library, online search for academic resources, study skills, referencing and use of EndNote which are delivered to the entire class in big lecture theatres. The computer workshops however are delivered to a class size of 35-45 students at a time, due to the size of computer labs, limitation of the support staff at hand at any particular time and also concerns about the quality of the delivery of the workshops. This means each workshop has to be repeated three times identically to cover the entire first year of the built environment students. 75% of the students said that they had previous experience of learning in large groups; of which 19% said that they had a neutral opinion about it, 17% liked or loved their previous experience of large class sizes, 3% said they disliked it, 5% gave other answers, and the rest did not rate their experience.

5.2 Teaching

The module was delivered in three identical sessions Mondays 2-4 pm, Mondays 4-6 pm, and Tuesdays 4-6 pm. When asked about preferences for when lectures are held, majority (53%) indicated that they preferred late morning lectures held between 11am and 1pm. The next preference (26%) was for early morning lectures from 9-11am.

IT forms the larger components of the module; which is predominantly designed to equip students with the elementary IT skills they require at the early stages of their study. Students were therefore asked to describe how their perception of technology will influence their teaching expectation.

The general feedback was that there was a general awareness of technology but that the approach to teaching should still be as traditional with support provided by members of staff instead of heavy reliance on high-tech teaching aids. Students still preferred direct face-to-face teaching and easy access to support staff as and when required (Figure 3). This would put forward a serious challenge, should heavily technology-reliant solutions such as Sigala's (2002) be envisaged to be followed.

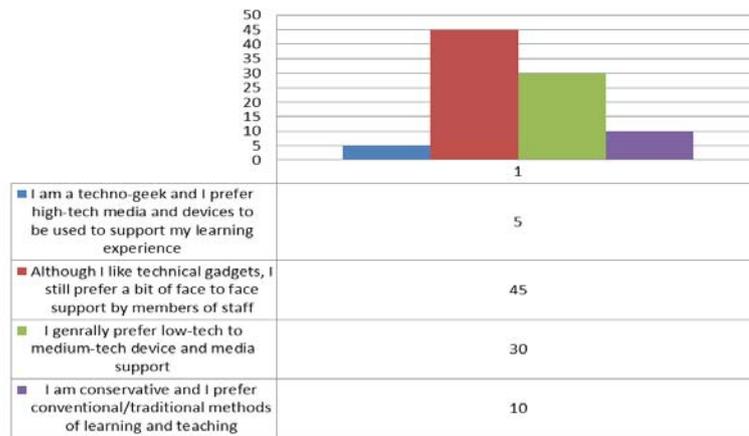


Figure 3: Preferred level of technology employment

To further support the previous finding, majority (56%) preferred workshop-type teaching sessions while 41% preferred the traditional approach of the teacher instructing the students (Figure 4).

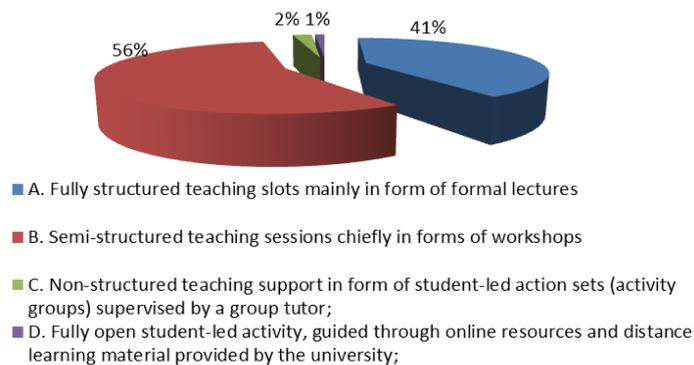


Figure 4: Teaching delivery preference

This is interesting because for the nature of the module i.e. teaching software packages etc., a mixed teaching approach of lectures/demonstrations and one-to-one support was considered more suitable for the delivery of the module.

5.3 Learning

To provide context to the findings, majority of the students said that their learning pace was average to fast (45% and 41% respectively) at the beginning of the module (Figure 5).

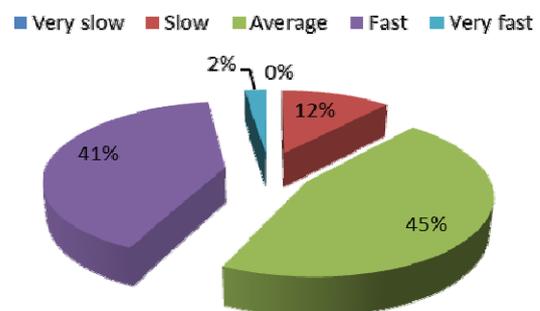


Figure 5: Typical learning pace as assessed pre-module

At the end of the module, majority (50%) said the teaching was well paced or adequate and suited to their learning pace. In addition, 21% rated the pace average. 19% rated it poor and 10% said that they simply could not keep up. The main problem appeared to be the mode of delivery and quality of teaching support provided (Figure 6).

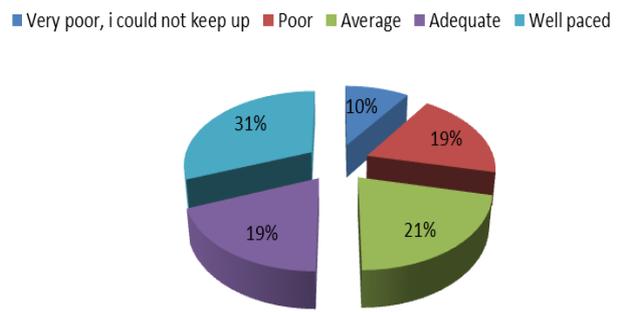


Figure 6: Learning pace as assessed at the end of module

Both self-assessed learning pace pre-module and the one assessed post-module in correlation with the teaching pace in the IT component of this module, prove that the variety of learning styles, paces, preferences and needs, require a more personalised approach to learning and teaching this particular module.

5.4 General comments

Some students considered that the pace was too fast for them. Others indicated that the layout, location and setting teaching rooms were vital for improving learning outcomes. Others will like teaching materials provided in more accessible formats. Overall, students were asked to rate 11 quality criteria for the module. Rated medium to low were; quality of lectures and tutorials, the value of class time as well as class discipline. The quality of additional support was also rated low by a majority of 18. Rated medium to high were; the course material provided, the assessment method, retaining skill and knowledge, links to other modules. The value of the module for the development of general knowledge and skills, and subject coverage was rated medium. Overall, the quality of the module was rated medium to low (Figure 7).

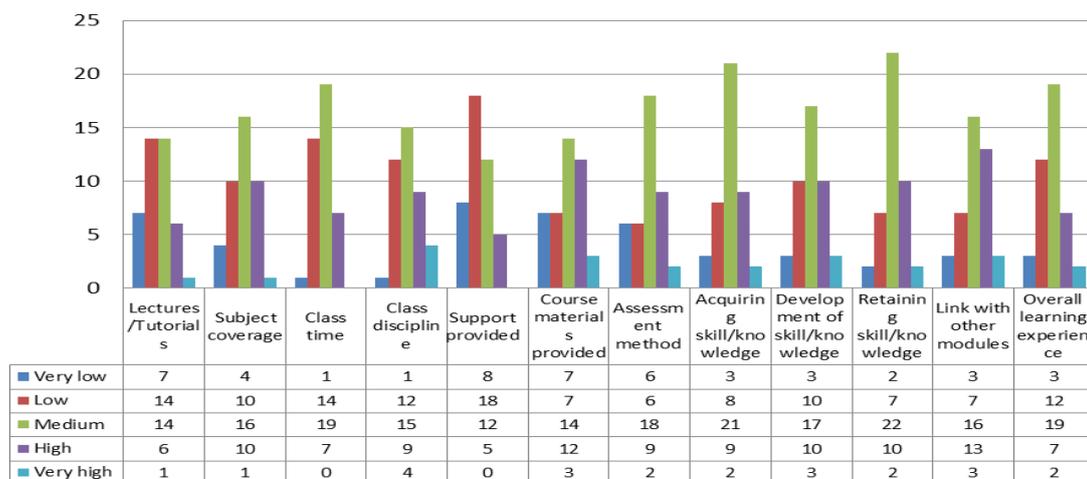


Figure 7: Overall Quality

Explanations given to support these ratings were that feedback from lecturers should be better and timely. The assessment criteria should be clear, and the pace of lectures should ensure that previous concepts are understood before introducing new ones. The support staff should be accessible for tutorials, the workbook is good but requires substantial improvement to minimise omissions, contradictions and confusion. Instructions should be clear and consistent too.

Specifically for the module and at the end of the academic session, students would also prefer more teaching time and tutorial support. They would have liked more time focussed on the specific skills that they needed to learn rather than the general ones. They will also like to have had clearer and accessible instructions about learning outcomes, coursework and other assessments (Figure 8).

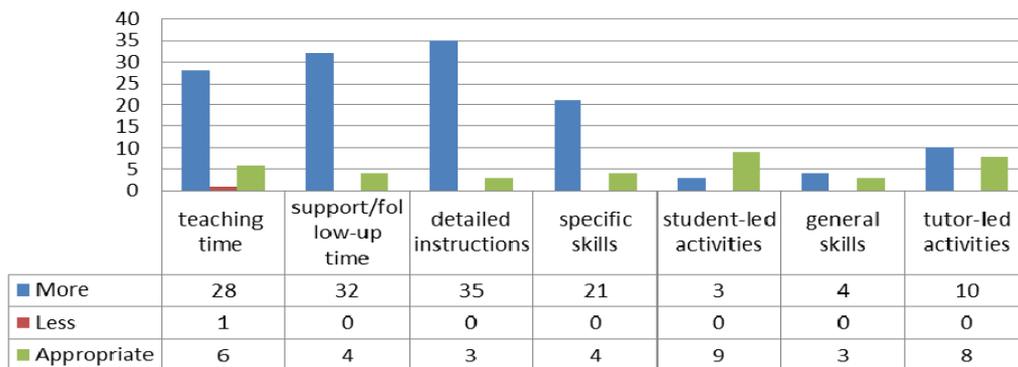


Figure 8: After-Preferences (The module in particular)

Provided that the delivery of this module was vastly overshadowed by the limitation on staff both at the start and more half way through the year as a result of a lecturer leaving the school, this required some modification in the content and context of delivery. Apart from the staff shortage, all the quantitative and qualitative data collected throughout the year using pre- and post-module surveys proved that all the students seek for more tailored/ personalised teaching and learning support to help them develop the set task and required skills in a more individual manner.

6. Conclusion and closing comments

This limited experience, which was designed to highlight the need for and importance of personalised approach to teaching and learning in higher education, like any other case-based experience, came with its limitations and restrictions. Provided that there was very limited element of personalisation and customisation built into the delivery of this module, its scale, the variation of the audience and the variation of the subjects to be covered under the umbrella of this module, the findings are still generalisable into teaching and learning in large groups both in general and in particular in the built environment disciplines. Here are some conclusions and executive recommendations which might prove useful when teaching large groups:

- Although this might contradict strategies of most of the higher education institutions especially in tight financial atmosphere, students in the HE sector in UK would like to see an

element of individuality in their courses to be convinced that they are getting the value for their money. This has a proven record in other mega-modules offered in second and third year in School of Environment and Technology, University of Brighton.

- Engagement is a crucial factor and very prone to be missed during lecturing large groups as a result of different learning styles and pace.
- There are possibilities to build some personalisable/customisable elements into such modules with huge target audience. This was tried in this research but quantification of results is not possible due to low number of participants. A further qualitative evaluation is required to come to a more objective conclusion for building such elements into the module.
- The amount of one-to-one or direct tutorial support is a key to develop a more tailored package for individual students specific to their learning needs and preferences.
- An established monitoring e.g. personal tutoring system can help facilitate building up a database of the individuals' learning style which can then feed into personalised approach to learning and teaching.
- A very careful survey of vocational gaps, needs and requirements will also help develop a top-down approach for a more realistically customisable learning and teaching solutions in vocational courses.

As the final closing comment it is worthwhile to bear in mind that customisation and personalisation at a module level might prove very difficult to achieve but it definitely is not unachievable, should careful consideration regarding time, space, the content and the context and the target audience be taken into account well in advance and perhaps at the stage of planning and development of the course curriculum, module descriptor and learning outcomes/objectives. It might prove much easier to design and deliver a fully personalised degree course with a choice of a variety of available modules for the recipient of the degree to choose from. This however, is subject to further investigations.

7. Acknowledgements

This research project was funded by the Centre for Learning and Teaching, University of Brighton.

8. References

Coffield F.J., D.V. Moseley, E. Hall, and K. Ecclestone. (2004a) *Learning styles and pedagogy in post-16 learning: a systematic and critical review*. London: Learning and Skills Research Centre/University of Newcastle upon Tyne.

Coffield F.J., D.V. Moseley, E. Hall, and K. Ecclestone. (2004b) *Should we be using learning styles? What research has to say to practice*. LSRC Reference. London: The Learning and Skills Research Centre. p. 84

Da Silveira, G., D. Borenstein, and F.S. Fogliatto. (2001) Mass customization: Literature review and research directions. *International Journal of Production Economics*. 72(1): 1-13.

Davis, S.M. 1987. *Future perfect*. Reading, MA: Addison-Wesley.

Duray, R., P.T. Ward, G.W. Milligan, and W.L. Berry. (2000) Approaches to mass customization: Configurations and empirical validation. *Journal of Operations Management* 18: 605_25.

Fried, V.H. (2008) Better-than-ivy education: \$7,376 a Year. *Inside Higher Education*. <http://www.insidehighered.com/views/2008/07/08/fried>. (accessed April 12, 2010).

Gabriel, R., M. Gersch, and P. Weber. (2007) Mass Customization und Serviceplattformstrategien im Blended Learning Engineering [Mass customization and service platform strategies in blended learning engineering]. In *eOrganisation: Service-, Prozess-, Market- Engineering*. 8. *Internationale Tagung für Wirtschaftsinformatik [eOrganisation: service, process and market engineering. [The 8th International Conference of Information Systems in Economy]*, ed. A. Oberwies, 3_20. Karlsruhe.

Huang, X., M.M. Kristal, and R.G. Schroeder. (2008) Linking learning and effective process implementation to mass customization capability. *Journal of Operations Management* 26 (6): 714-29.

Hutzschenreuter, T. (2002) *E-Learning and Mass-Customization*, WHU Research Paper No. 92, WHU Otto Beisheim Graduate School of Management. Vallendar, Germany

Kaplan A. M. and M. Haenlein. (2006) Toward a Parsimonious Definition of Traditional and Electronic Mass Customization. *Journal of Product Innovation Management*. 23:168–182

Liu, G., R. Shah, and R.G. Schroeder. (2006) Linking work design to mass customization: A sociotechnical systems perspective. *Decision Sciences* 37(4): 519-45.

McCarthy, I. P. (2004) Special issue editorial: The what, why and how of mass customization. *Production Planning & Control*. 15 (4): 347-51.

Mulder, F. (2005) Mass-individualization of higher education facilitated by the use of ICT. In *Auf zu neuen Ufern! E-Learning heute und morgen [In search of new land: E-learning today and tomorrow]*. ed. D. Tavangarian and K. Nolting. 13_4. Munster: Waxmann.

Nistor, N., A. Dehne, and F.T. Drews. (2010) Mass customization of teaching and training in organizations: design principles and prototype evaluation. *Studies in Continuing Education*. 32:3, 251-267

Pine, B. J. (1993) *Mass customization : the new frontier in business competition*, Boston, Mass., Harvard Business School Press.

Pine, B. J., and J.H. Gilmore. (2000) *Erlebniskauf. Konsum als Erlebnis, Business als Buhne, Arbeit als Theater [The shopping experience. Consuming as an event, business as a stage, work as a theatre]*. Munich: Econ.

Piroozfar, A. E. (2008) *Mass Customisation: The Application on Design, Fabrication and Implementation (DFI) Processes of Building Envelopes*. PhD Thesis. Sheffield, University of Sheffield.

Reichwald, R., and F.T. Piller. (2002) Der Kunde als Wertschöpfungspartner _ Formen und Prinzipien [The customer as production partner: Forms and principles]. In *Wertschöpfungsmanagement als Kernkompetenz [Production management as central competence]*. ed. H. Albach, B. Kaluza and W. Kersten, 27_52. Wiesbaden: Gabler.

Rippel, M., D. Schaefer, F. Mistree, and J. H. Panchal. (2009) Fostering Collaborative Learning and Mass-Customization of Education in a Graduate Engineering Design Course. *International Journal of Engineering Education*. 25(4): 729-744

Sigala, M. (2002) The Evolution of Internet Pedagogy: Benefits for Tourism and Hospitality Education. *Journal of Hospitality, Leisure, Sport and Tourism Education*. 1(2): 29-45.

Tseng, M. M. and J. Jiao. (2001) Mass customization. In: *Salvendy G, editor. Handbook of industrial engineering*, 3rd ed. New York: Wiley. 684–709. [chapter 25].

Tu, Q., M. A. Vonderembse, and T.S. Ragu-Nathan. (2001) The Impact of Time-Based Manufacturing Practices on Mass Customization and Value to Consumer. *Journal of Operations Management*. 19(2):201–17

Vesänen, J. and M. Raulas. (2006) Building bridges for personalization: A process model for marketing. *Journal of Interactive Marketing*. 20, no. 1: 5-20