RECONSIDERING THE ROLE OF STANDARD CURRICULA IN (IS / IT) EDUCATION DO STANDARD CURRICULA STILL FIT IN CURRENT SOCIETY?

Emőke Takács  
*ERI Hungary – European Research Institute*, t.emoke@eri.net.in

Bas Smit  
*University of Amsterdam*, B.J.Smit@uva.nl

Toon Abcouwer  
*University of Amsterdam*, abcouver@uva.nl

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RECONSIDERING THE ROLE OF STANDARD CURRICULA IN (IS / IT) EDUCATION

DO STANDARD CURRICULA STILL FIT IN CURRENT SOCIETY?

Emőke Takács
ERI Hungary – European Research Institute
t.emoke@eri.net.in

Bas Smit
University of Amsterdam
b.j.smit@uva.nl

Toon Abcouwer
University of Amsterdam
abcouwer@uva.nl

Abstract:
Given the fact that the majority of standard curricula are based on transferring existing knowledge, we raise the question whether in contemporary society they still address the challenges we are facing. We believe that dynamics and accompanying disruptions of our daily work require a way broader approach to curriculum development, then it has been done for the last centuries. Our research shows the need for more flexible programs, in which end-terms are defined in a different way. Standard curricula are only partially able to cover the challenges in contemporary society, and accreditation is no longer the optimal way for quality assurance in education. It became increasingly clear that the new programs are difficult to implement. Rules and regulations, administrative tasks, like the current practice of accreditation, also form a huge hurdle to prepare our future forerunners in society for the challenges, they will have to deal with, even in the near future.

Preface and positioning: This paper is written as a discussion paper. Developments in current society allow us to challenge traditional approaches to high-level education.

Keywords: Standard curricula, Learning objectives, Quality assurance in education

I. INTRODUCTION

“The dogmas of the quiet past are inadequate to the stormy present. The occasion is piled high with difficulty, and we must rise with the occasion. As our case is new, so we must think anew, and act anew. We must disenthrall ourselves, and then we shall save our country.” (Abraham Lincoln, 1862)

For centuries we are already aware of the fact that we will have to act anew in a stormy future. Modern developments are stressing this necessity to an even higher extent. An often-cited author on these issues is Ulrich Beck. His thesis of world risk society describes the world/organization as a system that no longer has the ability to control, or even describe the risks it is facing (Beck, 2002: 40-41). According to Beck, world risk society is the result of the speeding up of modernization. But modernization in general is a broad concept. Many fields in actual life are influenced by modernization. From the broadest perspective, Peter Singer describes globalization as an important cause of uncertainty and risk (Singer, 2002: 1). Current societal developments require a growing need for adaptivity and resilience (A W Abcouwer & Parson, 2011; Chandler,
2014; Ensor, 2011; Folke et al., 2010). Especially the development of future proves, that information systems require flexibility in the process of requirement analysis and system development capabilities (Volbeda, 1997). As we will show in this article, the traditional approach of building knowledge and skills does not suffice any longer, neither in general, but surely not in the field of IS (Mitra, 2005; Siemens, 2005). The growing needs in our complex or even chaotic dynamic world require the ability to answer questions we do not know yet (Tsoukas & Shepherd, 2004), which we experience in the field of IS. But the traditional educational systems focus on traditional reasoning: As shown in the figure below, in case of problem A, countermeasure B will lead to outcome C.

Figure 1 Reasoning in traditional educational systems

In contemporary practice, reality is not that simple any longer (Snowden & Boone, 2007). Nowadays countermeasure B may easily lead to outcome C but the next time also to D, E or F.

Figure 2 Reasoning contemporary practice

Our educational system is built on the assumption that future outcomes are predictable, and the cause and effect relations are known AND stable (A W Abcouwer, Smit, & Takács, 2016). Therefore, we will pose the statement that this no longer is the case. Acquiring problem solving techniques to our students do not automatically lead to better understanding the challenges, nor the way how to deal with it. A logical conclusion is, that we must express doubt about the value of education programs, we currently use. They are based on standard curricula built on a known and stable setting, and we have to approach learning in a different way to fulfil the requirements of today and tomorrow. In our view, the dynamics of today need multi-disciplinary teams to bring together creativity, to find solutions in a structural uncertain world.

The structure of this paper is the following: After focusing on setting the scene, we will define the basic concepts we use, then further elaborate on the impact on learning and education. Later, we check the new requirements for curricula and the shortcomings of the current educational.
traditions. At the end of this discussion paper, we will draw conclusions based on our observations.

This paper presents a view on developments that in our view are a necessity and thus should be initiated. Due to the strict regulations related to the practice of multiple accreditations in current higher education, we are only limitedly able to underpin our view in practical experiences. Although experimenting is only limitedly allowed, where it is possible, we will illustrate our opinion with practical examples.

II. DEVELOPMENTS IN CURRENT EDUCATION – SETTING THE SCENE

Society has evolved in a process, where learning formed the base for the developments. Using experiences and insights from the past, created the saying that ‘Standing on the shoulders of giants’ was true and formed the engine behind enormous societal developments. In a setting like this, learning was based on extracted knowledge from specialists. Society as a whole, developed itself into a continuous incremental improvement.

In education, several approaches were used for transferring knowledge from generation to generation.

In the middle ages the traditional approach was based on a master-companion structure, where every master was expected to assure that his knowledge was transferred to next generations in an effective way. This approach worked well, in local communities the availability of knowledge was assured, and every companion could add insights to the common knowledgebase in such a way, that society as a whole developed, resulting in increased wellbeing for the local community. A known shortcoming of this structure was also recognized in those days. The process of transferring knowledge in this way, was rather limited. A master had to perform and transferring the knowledge and skills to the next generation was only possible to a limited number of companions.

Around 300 years ago this structure began to be too limiting. In that period, the developments of modern society led to a growing need for people, who were able to populate the developing bureaucratic administrative structures that were developed. Mitra (Mitra & Dangwal, 2010) describes the developing setting as follows:

".... To run this developing big bureaucratic administrative machine a lot of people were necessary. In order to have that machine running in that time a new machine was developed: the school. Schools would produce people so identical, that one could take someone from New Zealand and transfer him/her to Canada to do the work."

This need was not only necessary for administrations, also the army and many other machine-like structures, which were developed in the world, needed a lot of people with well-defined capabilities powered by education in the schools. As Mitra showed, this education system was so robust, that it is still with us today.

But one of the main developments in current society is, that these well-defined machine-like processes are no longer done by people. In a growing number of cases, these processes are robotized and done by automated systems. Current educational systems still work like the structure, as described by Mitra (2005). This is quite surprising, when we recognize that challenges in current society are subject to increasing dynamics and disruptions (see for example the speed of changes in IS). In these situations, the traditional competencies and abilities are no longer applicable to find solutions for the problems we are facing.

In a recent research done in the Netherlands, Deloitte (Deloitte, 2016) points out that 42% of students in mid-level vocational education study topics, that will no longer be relevant when they graduate. At university of applied science level, this percentage is 19%, while at university level in general it is around 10%. In the accelerating world we live in, in many cases acquired knowledge is not relevant by the time students would use it in practice.
But this development does not mean that current school structure has lost all its value. Of course, knowledge has to be transferred to future generations, existing knowledge has not become worthless, but we have to enrich the educational systems with approaches that – aside of the necessary knowledge transfer – enable us to deal with the challenges of today.

It is our attempt to develop new approaches to learning, where the source of knowledge and skills are no longer limited to teachers, who are expected ‘to know it all’ (A W Abcouwer & Takács, 2016). We need to take advantage of any source of knowledge and skills, from anywhere in the world (as also stressed by European Commission, 2018a), to be open minded enough to combine the different insights (the EU uses in this sense the term ‘science with and for society’, European Commission, 2018b) in such a way that we stimulate creativity, to develop new solutions for today, tomorrow and for the unforeseen future. Based on this, the main objective of our paper is to find answers for the following:

**What demands for higher education come forward from contemporary developments in society and what does it mean for the future of our education systems?**

III. THE NEED FOR SOMETHING NEW

The research of Deloitte (2016) shows, that there is a need for a new, but additional approach to learning. Since the future by definition is unpredictable, it is hard to formulate how the education will look like. When we realize that ‘if A then B leading to C’ does not always work, we have to be courageous enough to experiment and fail our way to an unknown future. We believe that we should not hesitate to do something great, although its success cannot be predictable, because we learn from success AND failure.

There are many main reasons why the above-mentioned experiments are growingly necessary. These reasons are built on a number of developments that have been worked out in the form of several issues. The main reason is, that future developments are unpredictable, leading to:

- An increasingly complex world that leads to more specialization:
  - This complexity requires a deeper understanding of the developments leading to a monodisciplinary tendency in research, reflecting towards a focus on research-based education, where classes are only organised around focused topics of the current institutional research (see a.o. policy guidelines many Universities use these days on research-based education)
  - Also, big commercial research institutes in society show the tendency of concentration of research. The term ‘frightful five’ for the major research institutes (Amazon, Apple, Facebook, Google and Microsoft) is used to emphasize this tendency, causing a concentration of researches on a limited number of fields. Aside of that, the focus of the frightful five is merely based on profitability, instead of on societal benefits.
Both examples mentioned above show, that *specialization* is key in current research, leading to a monodisciplinary focus in the main-stream research programs. But aren’t the societal requirements merely multi-disciplinary by nature?

- On a societal scale, in our view there is a need for multidisciplinary approaches of contemporary problems: an increasing need for coordination and flexibility, to be able to deal with the impact of the growing complexity.
  - The uncertainty around the complexity forces organisations to make use of knowledge on a broad range of topics. Society is facing a declining number of cases, based on a single area of interest. Combination of different insights is a necessity, that is becoming indisputable. So, in combination with the need for specialisation, there is also an increasing need for multidisciplinary working. In society, the so-called T-shape competence model (Barile, Franco, Nota, & Saviano, 2012; Hansen, 2001) is introduced to deal with this need to deal with unforeseen developments (see figure 4). But being both a deep specialist on a specific topic, as well as a broad generalist to integrate the different specialisms, is not a capability, that is gifted to everyone.
  - Linked to this development, we see a growing attention to focus in education for being creative and able to integrate and combine different insights. Trainings, which mainly focus on building knowledge and skills fell short. As both aspects of learning are crucially important, integrating these two tendencies will be the challenge for future education. Among others, this means that there is a growing need for finding a balance between focusing on knowledge, and in the meantime on the development of appropriate skills and an attitude of curiosity.

The development as described above, will be necessary for organizations to deal with future and unforeseen developments. It is clear that there is an absolute need for being flexible and resilient.
IV. SOCIETAL CHANGE AND THE NEED FOR FLEXIBILITY AND RESILIENCE

Education in current practice is mainly organized in terms of learning objectives and end-terms of the curricula and measurability of the effectiveness of our education. The capacity of reacting in a flexible way on upcoming challenges is not well developed (Ensor, 2011). We need to better understand the reasoning behind this necessity from different theoretical perspectives in order to understand the gap we are facing between current education and the challenges of today (Fiksel, 2015). Below we mention some aspects relevant to this development. By being unable to cover all theoretical aspects of the different topics we limit ourselves to linking relevant theories that illustrate the raised issues.

- The need for understanding dynamics in society.

![Figure 5 ACoR](image-url)

Figure 5 ACoR
From a theoretical perspective, we refer to a model that found its origin in both organisation theory as well as ecology: the adaptive cycle of resilience (ACOR) (A. W. Abcouwer & Goense, 2015; A W Abcouwer & Parson, 2011; A. W. Abcouwer & Smit, 2015a; Lance H. Gunderson & Holling, 2002; Holling, 2001). The model assumes that any system (as an organisation in essence is) will inevitably face a crisis situation that brings it out of an equilibrium (I) state (Masys, 2012; Taleb, 2010). This disruption originates in any development both internal within the system as well as from any source of a development outside the system. In this approach, a crisis (II) is defined as a setting or state in which the traditional problem-solving approaches no longer work, and the organisation is aware of it. The necessity exists for searching a solution out of this crisis. This search process will lead to a number of potential new combinations (III) that can help the system to get out of the crisis. Because resources are limited, a choice has to be made which new combination will be operationalised (IV) in order to attempt to achieve a new state of equilibrium. The theory explicitly stresses that any operationalisation will probably lead to de initiation of a new crisis because the dynamics in society will make every system to be confronted with unforeseen changes resulting in a next crisis. This cyclical aspect of consecutive crises is one of the main reasons for the need for flexibility in education. Every phase in the above-identified model requires different competencies and thus different learning requirements. Currently, we do not really know the learning-path to follow because the knowledge requirements are uncertain.

A Relevant probability for determining the solution for appearing problems

The theoretical approach as introduced by Gigerenzer (2014) asks attention for the question about certainty of the solutions available within the dynamic development in society. Gigerenzer identifies three forms of probability: Certain – Risk – Uncertain. In case of certainty the solutions are available, the choice regarding the countermeasures to deal with the problem at stake are clear, a firm analysis of the problem setting leads to a solution to be implemented where in many cases the results are well predictable. When there are several solutions available and there is a problem regarding the choice which one is the best, combined with an unpredictability regarding the final outcome of the countermeasure Gigerenzer identifies this as a setting of risk. The different countermeasures are known, the final choice an effect of it is unsure.

The final setting the system may face is that of uncertainty. When the real nature of the problem is unknown, the solutions are unknown, the impact of any countermeasure is unknown and the knowledge necessary to find a solution is also unknown. In cases of uncertainty those involved will have to try a potential solution by experimenting or in case this is not possible by implementing what seems to be effective. Sensing the effects of the countermeasure and responding when

Figure 6 Probabilities: Certainty, Risk, Uncertainty
positive or negative effects become clear, will be the only way to deal with such a state of uncertainty. It should be clear that these three states and probabilities of solutions lead to completely different requirements regarding educational needs.

- **The kind of knowledge we need for finding a solution that fits the challenge**

In the above-described approach to dynamics regarding the required knowledge, we can make a distinction between the identified phases. When the organisation is in an *equilibrium state* or in the phase of *operationalising* the knowledge necessary for dealing with the chosen countermeasures is most probably known. With respect to learning and education the learning objectives and required learning outcomes are clear. This situation fits well with the traditional approach to learning as is implemented in current education and the eLearning systems in use (A. W. Abcouwer & Smit, 2007; A. W. Abcouwer & Smit, 2008). In case of crisis and during the search process for new combinations the requirements are way less obvious. Learning will have to be based on combining different sources of knowledge to facilitate co-creation. This requires a new form of learning community. Due to the unpredictability of the process, those involved in these phases need to trust on the creative capabilities of other community members and should show an attitude of curiosity in shaping the search processes (A W Abcouwer & Takács, 2018a; A W Abcouwer, Takács, & Keményffy, 2018). In current society, this state of uncertainty is of increasing importance. One of the main issues in a setting like this is whether the system (organisation) should choose an approach of *mindfulness* (Swanson & Ramiller, 2004) in which thinking first is initiated to define the characteristics of the challenge it faces. In some cases, the uncertainty of the outcomes of the countermeasures makes it impossible to think first. Doing first, trying something and see what impact it will have, is an often-used approach in these types of settings. It is impossible to predict beforehand whether the kind of knowledge is relevant.

- **Being able to deal with challenges.**

As mentioned before, the requirements for education are different in each of the phases of dynamic developments. The differences in certainty regarding the knowledge and skills needed in the specific setting are huge. This requires different competencies and capabilities of humans working in this field. In literature, there is a difference regarding the extend in which individuals are able to fulfil these requirements. The term *fit* is introduced in this field to identify the gaps that exist with respect to the requirements.

Three types of fit are identified:

- Person / job-fit (Carless, 2005), focusing on the issue whether someone is able to fulfil the job today
  - the requirements regarding knowledge and skills are clear. This fits well with the probability state of certainty in which learning objectives and learning outcomes can be defined.

- Persons / organization-fit (Cable & Judge, 1996) has a focus on the ability to follow the developments of the organisation where developments are more or less predictable and

- Person / future-fit (A W Abcouwer & Takács, 2018b) where we face uncertain futures.
  - the requirements are way different from those in traditional education. Up to a high extent the unpredictable future and the unforeseen challenges of education require flexibility and adaptive capabilities.

Based on the issues mentioned above the extent in which the organizations’ resilience depends highly on the extent to which an estimate can be made regarding the dynamics and probability of the solutions.

Here the concept of resilience comes into focus. In literature, three forms of resilience are formulated. *Engineering* resilience (Holling & Gunderson, 2002) deals with the ability to recover
from disturbances. Sometimes this form of resilience is called bounce-back resilience, and no real changes are necessary. It depends highly on the quality of those responsible for defining the countermeasures. When knowledge and skills are available, the organization is able to deal with the disturbances. In case of non-availability, education should focus on building a better person/job fit.

But dynamics are in growing extent more disruptive in character in such a way that on a certain moment changes will have to be adopted. Falling back to the old way of working no longer fits. Here comes the ecological resilience as described in literature into practice. Ecological resilience (Lance H. Gunderson, Allen, & Holling, 2009), the second definition, emphasis conditions far from any equilibrium or steady state, where instabilities can flip a system into another regime of behavior - to another stability domain. It is of major importance for an organization to be able to recognize when this form of resilience comes into practice. Linked to this type of resilience, education will have to deal with the ability of people to recognize the moment (Lance H Gunderson & Holling, 2001) where a switch will have to be made from “yes, we can still trust on our ‘old’ authenticated methods of problem-solving” to “no, the ‘old’ ways of working don’t work any longer, we will have to find something new”. In this specific case defining the necessary knowledge and skills is not what learning objectives should focus on. Attention should be paid to the impact and limitation of traditional countermeasures. In current dynamic developments, estimating the need for changed learning requirements in education is of growing importance. We will have to know when the focus shifts from traditional learning to creative and innovative learning (A. W. Abcouwer & Smit, 2015b). This impacts how curricula are developed.

In settings like above the role of resilience focuses on overcoming obstacles as lack of understanding, unwillingness to change, lack of adaptive capacity to perform the necessary actions and therefore change is needed. (Gallopín, 2001). The solutions are meant to influence the outcome of the change. Resilience in that respect has a different role: to influence the ability to find a new state of equilibrium. To distinguish this aspect of the concept of resilience Ensor (2011) introduces a third kind of resilience: Social-Resilience: the ability to find a new equilibrium state. This in a setting where a lack of insight exists regarding which knowledge should be educated. Traditional education will have to be replaced by new approaches to learning that finds their origin in social constructivism, connectivism and approaches of de-linearized learning.

To summarize the importance of the concept of resilience, we define it as the ability of the organization (and its systems) to withstand, recover from or adjust to misfortunes or changes in its environment and keep functioning.

V. THE ROLE OF STANDARD CURRICULA IN CURRENT EDUCATION

When we look at current education and the systems of quality assurance in use nowadays, the actual systems of accreditation of the curricula force the educational institutions to formulate strict defined and measurable sets of learning objectives and learning outcomes. Assessment matrices, summative and formative testing etc. are of growing importance in current accreditation approaches. The focus on objectivism in the learning process assumes that the learning outcomes can be measured in quantifiable measures dealing with knowledge, skills and processes. This is not trivial in cases of education based on social constructivism (A. W. Abcouwer & Truijens, 2004; Bartlett, Burton, & Peim, 2001; Cole & Cole, 2001), connectivism (Siemens, 2005) and de-linearized learning. In line with these approaches used in the accreditation processes, the development of standard curricula is mainly based on the assumption that we more or less know what will have to be taught to our pupils. In the examples of uncertain futures these requirements are far from clear and in settings like this learning objectives are hard to define. As we have seen, adding different approaches to learning must be considered (Goot, 2004). These approaches are rooted in a different mindset and will require considerable re-thought.

Does this mean that current education with its standard curricula is no longer valid? The answer to that is simply NO. As we have seen in different phases of the learning process the traditional learning approach is still highly relevant. In many cases, traditional education forms an
indispensable link in the process of educating young people for a valuable place in society. What we emphasize in this discussion paper is that traditional education is no longer sufficient and need to be supplemented. We will have to introduce new forms of education in addition to existing education. As we’ve seen it, given the current challenges the way current curricula are designed using standard curricula falls short in this respect.

In our view it is a primary task for universities to fill in this gap in current education.

VI. SOME CONCLUDING REMARKS

Based on the reasoning as developed in this discussion paper the challenges for education are high. There are modern developments on a broad range of topics, with much attention focused on concepts like competence-based education, blended learning, activity-based learning etc. As in standard curricula for IS/IT, the emphasize is mainly on insights of the past. However, focusing on these topics only partially helps, which made us writing this discussion paper. While these innovations may be necessary, attention must be given to innovating education with a different approach to learning objectives and learning outcomes. Also, developments, which we have left out of consideration, such as Life-long-learning, give indications that real changes are necessary.

![Figure 7 Traditional education, Improving traditional education or innovating education](image)

In this development, there are three issues of vital importance that can be the basis of our reasoning in this discussion paper, while facing increased uncertainty in societal requirements. In the figure above the issues are highlighted:

1) (red) The role of standardized curricula is decreasing because of the increasing need for flexibility in educational programs.

2) (green) In traditional education, the measures for QA follow from standard curricula. When there are societal developments the criteria are determined by society in face of the changes, and the ones based on standard curricula are less relevant. Lastly, in situations of uncertainty, one cannot imagine any other meaningful measure of QA, except those based on practical relevance.
3) (blue) Due to the changed role of standardized curricula as well as the changes where different QA criteria pop up, the role of accreditation needs to change. In terms of the clarity of the role of accreditation newly defined approaches will have to be developed.

The impact these developments have on the future role of education is not yet known. But the renewal and innovation processes for finding answers for the problems we are facing, will always start with posing questions; therefore, we raise some to answer together:

- What are the demands of contemporary developments in society and what does it mean for the future of our educational systems? Can standard curricula fulfil them? Do standard curricula still fit in current society or is it time to reconsider the role of standard curricula in (IS / IT) education? Does updating the curricula or the teaching methodology with the use of IS / IT satisfy these needs and requirements?
- Can the inclusion and adjustments of the different societal actors with their specific demands for higher education ameliorate the level of curricula? How can we include the relevant knowledge of these actors?
- Is sharing and exchanging knowledge a way for building new knowledge that is critical/useful for current students? Can it serve as a basis for flexible programs?
- How can we create a true learning community to facilitate co-creation of knowledge/curricula?
- Is combining the knowledge input from all participants in the learning community one of the main reasons why quality assurance requires extra attention? What mechanisms can be put in place for QA?

While this isn’t an exhaustive list of questions, as the developments are way too uncertain in this respect to be able to deal with the challenges the future might bring. But if we do not have the courage to start the discussion on these fields, traditional education will fall short of the role they should play.

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