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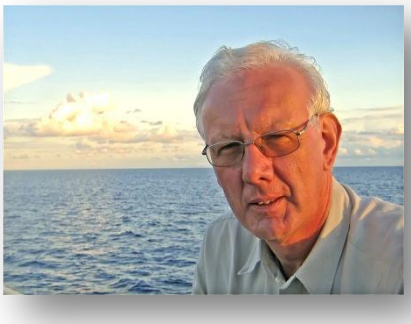


THE DOUBLE-HELIX OF IDEAS AND SKILLS: TWO INTERWOVEN LINES OF LEARNING FOR INNOVATION

My message today is that the curriculum of each college for vocational and technical education should be designed as two interwoven lines of learning: learning of excellent skills AND learning to generate ideas and to put them into practice (innovation). That is why I use the image of the ***DOUBLE HELIX***

Key Lecture for the 2011 conference of the
Trans-Atlantic Technology and Training Alliance

Stimulating Innovation and Creativity In Education
Embedding creativity in education and training

San Sebastian, May 1-5 2011

OVERVIEW

1. THE CONTEXT OF INNOVATION

The expansion of "new" economies (China, India, Malaysia, Brazil etc.) has urged the USA and Europe to believe that innovation might be the way for their economies to survive in this new competing world. Governments are urging companies and education to innovate, innovate and innovate.

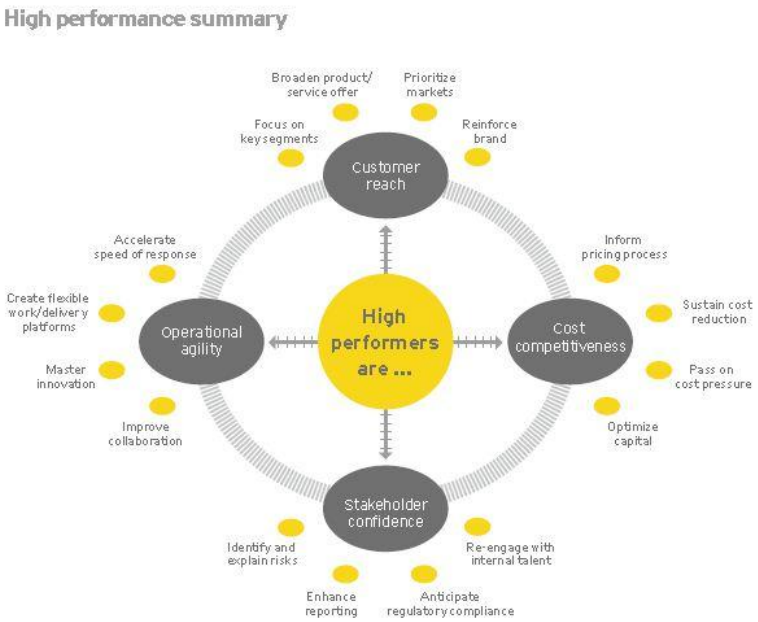
But was does "innovation" mean? And how to put it in practise? And is it true that innovation is the clue to economic growth in the USA and Europe? I will deal with the first two questions further on and spend a few words on the last one first.

IS INNOVATION THE CLUE TO ECONOMIC GROWTH?

Recently, Ernst&Young carried out a comprehensive research programme to find out what makes companies effective in the new economy. (Ernst&Young 2010: *Competing for growth – Winning the new economy*). Although innovation is important, other strategies are not seldom even more important. E.g. opening new markets for existing products or making sure that existing clients keep customers and more. So: innovation has to be understood as one aspect of a balanced set of constant improvements that E&Y sketch in the following diagram.

THE CONTEXT OF INNOVATION AS A DRIVER FOR HIGH PERFORMANCE

Ernst&Young 2010



2. INNOVATION AND CREATIVITY – THINK A MOMENT ABOUT THE TERMS

The theme of this conference is *"Stimulating innovation and creativity in education"*. What do the terms "innovation" and "creativity" mean? May creativity be there without innovation? Can innovation exist without creativity? Consider this case: a manufacturer of coffee-machines sends out after-sales questionnaires to customers. On the basis of this customer feed-back, the manufacturer decides to change the place and the colour of a certain button on the machine. This is certainly innovation, but is creativity involved? Perhaps: yes: the idea of having systematic customer-satisfaction surveys might have been an idea of somebody in the company. And customers had probably useful ideas about a better place of the button.

ABOUT CREATIVITY

The process of invoking and gathering ideas is what I will use as a working definition of creativity. (C.f. Gaspersz 2006). In this definition, creativity is not an attribute of a person in the sense that some persons might be creative and others not. It is rather a process that can be learned, improved, nourished and exploited. How to do this is what I will discuss further on.

ABOUT INNOVATION

Innovation can be seen as the process of substantiating a certain change in a product, an organisation, a production-process, in human resources management or whatever. It is a change that is supposed to add a certain value to customers, or an organisation, its employees or shareholders. So there are two key elements here: **realisation** and **added-value.**

Innovation happens on the basis of ideas. But not every idea leads to innovation.

DuPont needed 3000 raw ideas to evoke 12 projects for product development. Only one successful new product came out of these 12 projects. (MOSS KANTER a.o., 1997, p 71).

The message is that innovation requires a broad basis of raw ideas. Many ideas will in the end not be used in the context of a specific company. However, you never know beforehand.

3. INNOVATION AND CREATIVITY IN EDUCATION PROGRAMMES OF VOCATIONAL AND TECHNICAL COLLEGES: THE DOUBLE HELIX

In the following paragraphs, I sketch good practices of how creativity is used and stimulated in business life. And how effective it might be.

The life of individual inventors is a bit different, and I will comment on this in paragraph 6. However, most of the listed good practices apply to both individual inventors and employees in a business environment.

My message today is that such good practices should be an integral part of the curriculum of each college for vocational and technical education. That is why I used the term of the **DOUBLE HELIX**: two interwoven lines of learning: learning of excellent skills AND learning to generate ideas and to put them in practice (innovation).

I know that some schools innovate themselves in such a way. That is excellent of course and a welcome element of an advanced **DOUBLE HELIX**.

> *"… policies designed to promote innovation, … have tended to focus on the need for increased expenditures on Research and Development (R&D), on raising the percentage of the population with tertiary educational attainment and on furthering the diffusion of Information and Communication Technology. …. The results presented here suggest that the bottleneck to improving the innovative capabilities of European firms might not be low levels of R&D expenditures, …. , but the widespread presence of working environments that are unable to provide fertile grounds for innovation. ……"*

4. THE WORKPLACE AS FERTILE GROUND FOR INNOVATION

Some innovations obviously arise from ideas from creative persons or from experience in R&D. However, even more ideas arise from regular workers on the workplace. And these fertile grounds are often very effective!

TOYOTA

One of the tools Toyota used to improve their production through the well-known "lean-production" process was to have discussions between workers and their boss under the assumption that one idea from hundred workers is better than one hundred ideas from one team leader. (c.f. the example of the British Leyland , below).

A recent OECD report underlines the point:

(OECD, 2010, Fragment of summary)

The examples below may illustrate how the workplace might be fertile ground for innovation and how effective it might be.

INNOVATIONS FROM THE WORKPLACE: FOUR ILLUSTRATIONS

1. I once visited Philip Morris's Plant at Bergen op Zoom (NL). Philip Morris has several plants all over the world and they are competing with each other. The Dutch Plant was the best; they had completed all standard improvement programmes. So what to do to keep that position? It was decided that the only way to improve further was to use the creativity of all workers. People were encouraged to communicate all sorts of ideas. Each quarter of the year, a special taskforce with staff from all levels had as its task to implement as much ideas as possible.

2. A Japanese firm stopped their contract with the Tokyo University of Technology to develop a prototype for a flat screen for laptops and instead created 3 competing teams within the company to do the job [personal observation];

3. British Leyland improved the quality of the Austin Mini by allowing workmen to stop the assembly line when needed and to change tasks on a voluntary daily basis. There was about 20 minutes talk of the production team each morning. The number of failing end-products decreased substantially;

4. The Dutch firm **NEDSCHROEF** produces bolts en nuts for all major car producers and now names itself a *Fastener*, to express their mission. BMW sends a car to the factory and the workers completely disassemble the car and suggest better solutions for fastening the different parts, or for different bolts (e.g. lighter ones).

INNOVATION FROM THE WORKPLACE MAY BE VERY PROFITABLE:

The Dutch Telecom company KPN saved in 2000 49 million Euros on the basis of 4000 ideas.

Dairy company Campina saved almost 1 million Euros on the basis of 1000 ideas. Most ideas were about improving the efficiency of the production processes and came from production-workers

American Airlines started once the IdeAAS programme. More than 86.000 employees suggested 17.000 ideas in one year, which saved the company 43 million dollars.

5. EVOKING IDEAS – HOW TO SUSTAIN A CLIMATE OF IDEAS?

THE DOUBLE HELIX OF IDEAS AND SKILLS

In industry as well as in education and training, we are inclined to focus on the task at hand. This is important, because it helps to be precise, fast and controllable.

However, for innovation, employees, staff and students should not only develop their skills for the tasks at hand, but at the same time be prepared to gather and share ideas. Two processes that are strangled around each other, taking place in the same time and place and having both their own strength. I believe that using and maintaining excellent skills can exist without evoking ideas, but evoking ideas without excellent skills may be doomed to fail.

In this presentation, there is no need to discuss the process of developing and maintaining excellent skills. I will focus on developing and maintaining a constant flow of ideas and how to use them for innovation. I listed a series of Good Practices that may help to design a curriculum line for creativity and innovation.

HOW TO ESTABLISH A CONSTANT FLOW OF IDEAS?

RESISTANCE AGAINST IDEAS

Although everybody generates ideas – often rather unconsciously, many do not often expose such ideas. There are several reasons for this. First, they may feel insecure about an idea and do not dare to communicate something that they are not sure about. Secondly, the primary reactions from others may be rather reserved or even rejecting: “we have tried that before”, “sounds nice, but not very practical”, “nice idea, but not now”, “this is not your business”, and so on. The underlying message seems to be: “shut up!”.

Others believe that idea-generation is something for special (“creative”) people or special R&D departments. I believe the opposite. Everybody has a creative side, and it can flourish and develop. But it might take some guidance to trust yourself and to deal with resistance.

GOOD PRACTICES

1. LEARN TO TALK ABOUT IDEAS, trust yourself, make a list of your ideas and share the list with somebody you trust; accept that some ideas rest on the bookshelf for a long time.
2. USE YOUR EYES AND EARS, observe users, be close to action. It is not good enough to ask users what they think about a product or a service, or read survey-results of the marketing department. One reason is that people often do not know how to articulate the “true” answer. So, go to the spot, observe and listen yourself and note down which ideas came to your mind. (By the way, many students are required to write a report after a study-visit; I would recommend not to ask them to write a report, but to make a list of ideas – alone of together.)

GO TO THE SPOT!

IKEA®
Home is the most important place in the world.

A board member of IKEA told me that IKEA started their US stores only after board members and others visited many US families in their homes and joined them on a normal day.

Terry Klebahn was a 26 years old Stanford product design student, but created the Atlas Snowshoe Company after he noticed the miserable shoes he had to use after an ankle fracture

3. MEET OTHER PEOPLE. Do not only meet people from your own business, but meet others in different environments. Go away and use eyes and ears. Travel abroad. Embrace diversity. I would say that students should at least meet people from different branches, each month. For businesses, this is important to avoid a well-known effect of improving the business from the workplace: you become better and better in the same market with the same processes. The danger is that you lose sight on new markets and new products.
4. BRAINSTORMING. A good fluid brainstorming session may generate more than one hundred ideas. Kelley helps with an excellent instruction on the perfect brainstorm. Just to mention some advices: have a brainstorm session about each month; not longer than about one hour; use verbs and not nouns to stimulate idea-generation: not: "a beautiful store", but: "better shopping". Read Kelley, 2001, Chapter 4, to learn the seven secrets to make a brainstorm sing!
   A variant of brainstorming is BRAIN-WRITING. Here, each participant writes down an idea on a card and shifts the card to others in the group, and receives ideas from others as well. The electronic variant is of course even more powerful, because people can participate from their working place, all day.
5. TEAMWORK. If you bring a group of people together and assign them a task, they might often fail. A "hot" group consists of people with different abilities, who share the same passion for bringing a certain idea to practice, who like joking and playing around, who have respect for their fellow team members and like to connect to the outside world. Participation in a team should be voluntary. Unfortunately, I have noted that colleges often create teams of students were such conditions are not always met when colleges use group-work.

GOOD CONDITIONS – MANAGING CREATIVITY IN A COMPANY OR COLLEGE

If you want to stimulate creativity in a company (including colleges!), you are immediately confronted with the tension between order, hierarchy on the one hand and freedom and a certain degree of chaos on the other. Creativity is difficult to organise, but you can create conditions.

Gaspersz helps us and defines three "core tasks" to create favourable conditions for a creative work floor.

1. CREATE A CLIMATE FOR CREATIVITY: recognize (and I would add: train) creativity-leaders, ensure diversity of observations, share observations and knowledge, accept risky ideas, tolerate failure, make internal entrepreneurship possible, make ideas visible and show the effort to use them (c.f. the example of Philip Morris, mentioned before), create a place to work on ideas, to let them germinate: a sort of "greenhouse".
2. EXERCISE CREATIVITY-SKILLS: mind mapping, thinking in metaphors, brainstorming, provocation, brain writing, learn to ask questions that deepen the understanding of an idea, learn to postpone a judgment, learn to change perspective, etc.
3. MANAGE IDEAS: Catch the inflow of ideas; create a virtual box on the intranet, which is inviting and easy to use; Make all ideas easily and constantly accessible through an electronic databank; order ideas in some sort of system (e.g. expected contribution to firm-affectivity, expected speed of realisation); Enrich ideas through one of the techniques mentioned above; appraise contributions by explicit acknowledgement or in some cases through money. Implement ideas and communicate results.

6. FROM IDEAS TO INNOVATION – HOW TO DO THAT?

In this paragraph I will focus on individuals or college students, who might have ideas and want to put them in practice. Many brilliant ideas never reach the stage of becoming reality. Since 2004, there are 7 winners of the "Best Idea of the Netherlands". None of their ideas entered the market! This is not a problem. We need a multitude of ideas and prototypes for any innovation. It is not a problem to live with a head full of ideas. However, from time to time, we want to make it real. The question is: how to do that.

I learned from Jelle Kok and his mother Noks Nauta. Mother and son worked during a year with a group of youngsters with ideas and coached them through the process from idea to innovation. They decided to document their experience (Kok & Nauta, 2010). Their summing up is helpful, and several elements perhaps even crucial for putting ideas into practice.

FROM IDEA TO INNOVATION, GOOD PRACTICES:

1. SHARE YOUR IDEAS WITH OTHERS. Ask referees to stick to positive feedback in an early stage; ask for critical feedback later.
2. DEFINE A GOAL AND LEARN ALONG THE TRACK. Think about the sort of outcome you want and on what timescale you want to achieve this. Barry Zimmerman found that achieving a goal is not so much a matter of motivation, but rather of "self-regulation": the ability to learn along the road, the ability to change when they might lose the track, the ability to think about one's own weak and strong points (Zimmerman, 2001).

Important is also to know that goals may have to change during the process.
(It is said that the 2009 crisis of General Motors was partly the result of sticking too long and too rigid to the business objective of earning back 29% of the American market)
3. CREATE A PROCESS ENVIRONMENT: Develop a support platform, find advice on design and strategy, find finances and prepare implementation. Build a network.
4. CHOOSE AND ORGANISE ACTIONS. You may work alone, or together with others. You may even use *crowdsourcing* to build a community of collaborators to bring an idea to practice.
5. PROTECT YOUR INTELLECTUAL PROPERTY.

Use the World Intellectual Property Organization (WIPO) or the Benelux Office for Intellectual Property (BOIP) to get information and help.

6. EVALUATE. Decide upon continuation or finishing your project from time to time.

FROM IDEA TO INNOVATION, CONDITIONS THAT MAY HELP

Enterprises have generally the facilities for creativity and innovation – development, or they may develop them by focused investment. This is different for individuals, or (groups of) students who want to bring ideas to practise. For these students and individuals it would be good to develop an infrastructure for a creative and innovative society / school. Thiese facilities should include:

1. A FUND FOR RISK INVESTMENT / starters
2. WORKPLACES WHERE IDEAS CAN GROW (Greenhouses – perhaps a service offered by school-business partnerships)
3. AN ADVICE- AND SUPPORT SERVICE staffed by dedicated teachers and business staff together.

7. CONCLUSION

1. Innovation in a company has to be balanced with other measures that improve effectiveness, such as opening new markets for existing products and taking care of existing customers.
2. Investing in creativity on the work floor can be very effective and perhaps even more than R&D. At the same time it can be very motivating.
3. A climate where ideas are constantly generated, stored, communicated and used can be developed by exercising Good Practices, like the ones mentioned in paragraph 5.
4. The step from creativity to innovation requires special attention. Not only within an enterprise, but certainly where an individual, a student or a group of students want to bring an idea to practise. Good Practises as listed in paragraph 6 may help.
5. The curriculum of each college for vocational and technical education should be designed as two interwoven lines of learning: learning of excellent skills AND learning to generate ideas (creativity) and to put them into practice (innovation). This idea is expressed by the image of the **DOUBLE HELIX**.

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