

Innovation, Education, Research and Re-engineering.

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Content

Innovation, Education and Research.....	1
Re-engineering higher Education in Continental Europe.....	5
Creative destruction of Post-secondary Education; the University a Discussion.....	7
Literature.....	9
Bijlage : De verkruimelde Universiteit.....	11

What are Universities for?

Collini.

"Humanly, the very best thing we can say about something that it must be reformed, because the implication is that it is indispensable and suitable for a new life",

Ortega y Gasset.

[Innovation, Education and Research.](#)

The title of this section, "Innovation, Education and Research", displays a sequence of activities that are not common. The following string is the usual one: Education, Research, Visitation, Valorization and Innovation. The transformation of this string into the string Innovation, Education and Research, is the subject matter of this section.

Is the string "Education, Research, Visitation, Valorization and Innovation" a kind of production chain? Or is there no coherence, is it not a production chain at all?

In *"Innovation and its Fallacies"* (www.leennoordzij.me) it is mentioned that universities produces good scientific results. However, the final step towards the market or rather the commercialization of knowledge is not or hardly realised (the innovation paradox). The first question that arises is: should that be? The answer to this question is emphatically no! Even more pronounced: it cannot. The cases where research leads to innovation rests on mere coincidence. Innovation cannot be the argument for research at our universities. (N. N. Taleb, *Antifragile: How to Live in a World We Don't Understand*).

Kuhn also gave his opinion: *"Under normal conditions a research scientist is not an*

innovator. The scientist is a solver of puzzles, and the puzzles on which he/she concentrates are just those which he/she believes can be both stated and solved within the scientific tradition”.

Dauids et al (2013) explain in their book (2013) that the innovation paradox does not exist. Scientific research is not the essential prerequisite for innovation.

Innovation and, in any case, breakthrough innovation is mainly based on serendipity and coincidence. Obviously, the spirit of entrepreneurship has to be there.

Let’s use a kind of "proof by contradiction" to explain scientific research is not the essential prerequisite for innovation: If research and innovation were to be related to the usual string(chain), then we have found the key to innovation. In this way, everyone has the key to innovation! Innovation can be organized. The Holy Grail is found. Well, it does not work this way.

It is not only a paradox, it is a vicious circle. When Universities consider stimulating entrepreneurship for the students to be their primary goal, then research becomes less important. This saps their policy that research is the primary source of innovation and they are no longer in the position to stimulate entrepreneurship. Even Mazzucato shows that there is not such a thing as a linear relation between research and innovation.

However, we can reverse the sequence of the usual string and allow innovation to stimulate research. If that is successful, results from research will have an impact on education. Hence, we are teaching (young) people the latest developments in technology, processes, etc. Also innovation can lead to innovation of the education: E-learning. (Christensen C. M., M. B. Horn and C. W. Johnson. *Disruptive Class. How disruptive innovation will change the way the world learns.*)

The misleading idea “scientific research just to be intellectual game playing” has been a major drawback scientific teaching and research.

How come? Well, a lot of what are tools in today’s real world begins its life in the ivory tower. No GPS without relativity theory. However, a time delay of more than half a century(Bartusiak). Matrix algebra invented in 1855. CAD depends strongly on matrix algebra(Stewart). A time delay of more than a century. It is pure serendipity that someone sees chaos theory has a practical application.

This teaches us not to try to establish a relationship between research and social relevance. But also not with innovation. Breakthrough just happens with a lot of luck and by chance. By trying to force a relation between research and social relevance into a straitjacket, it only leads to a waste of time and to groupthink with little risky research programs as a result. The Dutch NSF(NOW) only makes sure that politicians think that university research funds are well spent.

The application of Einstein for his research on general relativity was in any case not honored by NWO.

Furthermore, the Director of STW (part of NWO) is not really happy with the way things are going. In De Ingenieur (January 2015, Nr. 1): "We assign the national research budget to proven technology, since we think we can manage the risks.....". That is exactly what is happening in the NWO programmes and in the top sectors: minimizing risks by taking

familiar roads. A kind of groupthink in which the same subjects are in the focal point of interest. As a consequence breakthroughs will hardly occur. Well, the above statement looks like support from unexpected angle for the abolition of intermediate layers such as NWO.

The above sequence of education, research, visitation, valorization and innovation has now been mentioned a few times. We now know that the order of the sequence is the other way around: from innovation to education. But, how meaningful are all the elements of this series? Visitation and valorization have not yet been mentioned.

Visitation can be said to be a kind of quality control of education and research. What is quality in this regard? Apparently, it does not go beyond a sort of benchmarking. The major danger of this benchmarking is that it gives rise to "regression to the mean". All universities are equal. Can some be more equal? Can it be different? Is Visitation necessary? In any case, it must be clear what a technical university stands for. This is not the issue now.

Valorization has been introduced to determine whether the university research can give rise to market mature/innovative products. In light of what has been described above on innovation, valorization can be deleted immediately. No more National Committee Valorization. The 'Valorization Day' can also be abolished. (J. Tolbeek, *The Spirit fairground*). A meaningful, refreshing austerity.

An opportunity for innovation at Universities can be found in organizing of research. Anno 2013/2014, the research has been disclaimed by flawed verification of the research (the Economist, 19th October 2013). How to deal with this? Resources should be available for research replication. This will increase costs in first instance. The fruits can be picked up in time. A University can be distinguished by a Chief replication Officer(CRO) with responsibility at the level of the Executive Board.

Moreover, a representative of the EU has said: 'No funds will be made available for replication'. What can be the role of the EU?

However, something is going on in The Netherlands. NWO, the Dutch organisation for redistribution of research budgets, started in 2016 a pilot programme on Replication studies(www.nwo.nl). Well, this can have a huge positive effect on improving of efficiency by reducing bureaucracy. The conclusion of such a programme could be no need for a CRO. Furthermore and even more important NWO could redirect and limit their budget to support replication research. Consequently, the administrative burden on Universities is reduced in a considerable way by reallocating NWO's research budget for the Universities back to the Universities.

We still have a lot of doubts about replication research, not so much about the improving inefficiencies, but about changing the culture. There is some hope now, not through increasing budgets for replication research. No, it is through major journals which are willing "... to publish papers that were scooped less than six month ago. And in a clever bit of rebranding, they're abandoning the word "scooped" altogether in favour of calling these "complementary" papers...." The Atlantic December/January 2018 issue.

For Universities: from valorization to replication or better Complementary Research! We

must also stick to the adage that results of research are premature. Aspirin(ascor) is still a source of research after 100 years.

Universities guess to be innovative by using a label like "Top University". However, not all universities can be TOP universities. Good training should be more appreciated. A discussion about the definition could be of some help(Caplan). Utilitarian arguments hardly play a role. Let's just call it "Bildung" again (H. L. Wesseling). We could also denote Bildung by liberal arts. What's in a name? Well, that is the question.

There is something in a name. See Fareed's *In Defense of a liberal Education*. To begin with, tertiary education (vocational and/or liberal arts education) is only successful when there are motivated teachers (Roth).

Caplan and Collini painted a picture of the complete spectrum of education: from vocational training to liberal arts. Caplan is of the opinion universities role is for the greater part a signaling role: students at top universities have shown their ambition. What they learn obviously does not matter. A recent example of signaling is given in *The Economist*(January 5th 2019): signaling of labeling.

We have to choose.

Tertiary education is sometimes denoted by 'Ivory Tower': "Get out of your ivory tower and live in the real world", the message comes by television networks. Networks that would not exist without generations of scientists, engineers and mathematicians(Stewart). What more to add? We could add something. Having educated our students, they will leave the Ivory Tower to the benefit of, e.g., the networks.

Now an example in The Netherlands of what hardly can be called innovative.

Zeker niet innovatief zijn verhuizende wetenschappers binnen Nederland. Een motief voor een dergelijke actie was/is: "Universiteiten willen zich meer onderscheiden". Ook wordt dan Amerika erbij gehaald als voorbeeld. Tja, een verhuizing van MIT naar Stanford is vergelijkbaar met een verhuizing van Twente naar Maastricht. De Nederlandse belastingbetaler die € 500 miljoen mag ophoesten zal niet overtuigd zijn.

The Universities do feel a lot of pressure. They have to accommodate NWO(Noordzij, *Abolish 2.1*) and try to comply with the so-called Topsectoren leading to a misallocation of the taxpayers money.

It is wishful thinking NWO and/or Topsectoren redirecting the research agenda of universities. The moment they try to do it in a meaningful way politics will lose their interest. This simply results from the inertia to change at the universities. Let me make it clear: this is quite natural. It takes time to adjust education programs to new insights resulting from research. Alas, from time to time, efforts will be made by governments or their representatives of the presumed "needs of society" to redirect R&D in some favoured so-called practical direction.

Re-engineering higher Education in Continental Europe.

When we consider higher education in Europe and in particular the Netherlands, it is important to start with the framework within which this education functions:

- In Europe, Government/politics plays a decisive role. The education and research becomes mainly (> 90%) financed from general resources.
- Staff members of European universities are civil servants.
- Higher education takes place in institutions where both education and research take place.

Which problems do we face in higher education?

Due to limited or stagnant economic growth, the higher education budgets are under pressure. In the Netherlands, the distinction between university and college for vocational training slowly fades. The universities all have the ambition to be Research University. The colleges also have this ambition. Problem: Academic Drift or Mission creep. Consequently there can be a lot of infighting/lobbying on political level.

Let's look into some numbers: In Europe there are around 3000 institutions of higher education and they all want to be Research Universities. (See also the Appendix: De Verkrumelde Universiteit).

In America there are also around 3000 institutions of higher education and there are about 100 Research universities. The top 20 of the Shanghai Ranking has been formed by non-continental European universities for many years.

It is to praise we in Netherlands do have the ambition to be with all our Universities in the top of the Shanghai Ranking. However, some sense of reality could be helpful. One Dutch University in the top ranking would be nice. To arrive there choices have to be made. Are the politicians prepared to do just that?

As mentioned before, governmental budgets For higher education and research under Remain busy. Now, in 2019, there will be continuous pressure on under-grade education to reduce costs.

We in the Netherlands will have to make choices. We cannot all be Research Universities. Whether politics will stimulate these choices? This question is difficult to answer. But certainly when there are fewer dogs fighting for a leg there is also less manipulation. Choices: Which ones? At least one asks for action. This one it has been called mission creep and academic drift. Mission creep and academic drift is hardly to prevent in the present situation. A situation indeed.

Making choices, we need to prevent unhealthy competition between Universities and Colleges for vocational training.

To start with, do not allow Colleges for vocational education to denote themselves Universities. Since when we allow this, we practically institutionalize academic drift and mission creep. Resulting into a sort of discrimination of vocational training(Caplan). In addition, a major issue is the 90% of the cost of education being covered by taxes payers money. This is the situation all over continental Europe. So, is the Dutch biotope. Therefore we will have to find solutions with the increasing demand for higher education,

despite demographic developments, from the market for vocational education. And to efficiently deal with the limited resources.

We have to promote the cooperation between Universities and Colleges for vocational Training. The market(Industry, etc.) should convince the education industry it is about skills and not about signaling. This is at least of some help to prevent mission creep and academic drift.

The balancing of the various tasks are obvious :

- The colleges are focused on bachelors training and vocational education, with the possibility of continuing one's study at a universities,
- The universities focus on liberal education, the graduate school and Phd.

In this way Academic drift decreases and the possibility of creating research universities of a certain critical mass will increase. De industrie wordt beter bediend met het accent op vocational education.

Is the consequence of this allocation of tasks a merger of Colleges for Vocational Training and Universities? The need for differentiation is obtained through a merger (WRR-rapport 90)? May be. On the other hand, a merger could institutionalize additional bureaucratic layers. The major technological institutes like TNO, can play an intermediate role play between the universities and the business community.

It comes as no surprise to see a growing market for vocational education, The Economist March 19th 2016. I do not know whether it is a shame that this disruption is initiated by the market: private education. It is in the air. Again The Economist June 25th 2016: attention to higher education is given in the International section. The title is almost self-explanatory: A new crop of hands-on universities is transforming how students learn. It is not just about "how" but also about what. Employers strongly advise to pay attention to vocational training and to train the skills which the market longs for.

A necessary condition –obviously not sufficient – for admission to College and/or University is students with good training. The teachers at prep. Colleges(VWO-The Netherlands) should not lower the bar for university entrance, but make them higher. That's not what's going on in The Netherlands. Mathematics is a particular problem. In some Colleges mathematics has been split into Mathematics B and D. As you can imagine, D is a bit more difficult than B. Since pupils can choose(D is not obliged) you can guess, most of the students dropped D and consequently the success rate of these prep. colleges increases. With positive effects for the budgets of these prep. Colleges. Leaving universities with the problems of the lack of required basic knowledge of mathematics. For students in prep. Colleges it is also frustrating to suddenly find out in your third year that there is no possibility of acquiring the Mathematics D knowledge. Even some prep. colleges, with a so-called Technasium(The Netherlands) dropped Mathematics D. In this way they needlessly created hurdles for young people who like to work in top level laboratories. In these laboratories there is a close relation between inventing and applying new instruments and research. Think of Kamerlingh Onnes, a Dutch Nobel Prize winner.

A cynical remark in this respect is that the prep colleges could improving their success rate even further. This obtained by a split Mathematics B with the expected result. That is the

approach for managing your talented students in prep. Colleges. Government, wake up! May be this a call is on deaf ears. Can Universities do something about this? Well, I am not sure after reading “The Fall of the Faculty”, a true horror story, The administrators and staff are busy with empire building instead of supporting Faculty by improving core processes: educating young people. The aforementioned book is about the US. However, I think the situation differs not that much from the situation in Continental Europe. Indeed, it differs not that much. In 2016(sic) university administrators are thinking of implementing ideas from manufacturing: lean production. These administrators are playing with secondary issues not related to the core business(to use an expression) of Faculty. It is ironical to realise lean production concentrates on bringing responsibility back to where it belongs: the production worker. So there is some hope. In the situation where administrators really understand lean production they learn to strengthen Faculty by returning responsibility to where it belongs. Do administrators realize doing their job well they creatively destroy their job? Did administrators really understand lean production? Did they read the book: “*The Machine that changed the World*”, written some 35 years ago?

Tertiary education has become a mass production system, leading to questioning quality of the delivered product: educated young people.

Well, again we can learn a thing or two from education in the US. Longitudinal research on education is reported by Arum and Roska. It does create much hope. Also Caplan(2) in The Atlantic wonders “*What’s college Good For?*”. The latter paper is rather cynical about students. However, it is society that makes them philistines.

What now? Push, usually a top down proces, does not help and only causes frustration and stagnation, resulting in a major failure. But what does it help?

Well, as mentioned before, innovation can be of great help. Carey describes the situation in the US. The huge fees and the strong incentive for just doing research instead of teaching is a driver for creative destruction. Like Christensen, et al, Carey strongly believes that digital learning will save under-grate education. Re-engineering higher education gets special attention.

[Creative destruction of Post-secondary Education; the University a Discussion](#)

The university is among us for some 1000 years. What is the university for (Collini), what universities are we looking for?

- The Bologna style university (some 1000 years ago): students paying their professors and sometimes sacking their professors.
- The Humboldt Research university?
- The hybrid, research and education, university?
- The new Humboldt University(The Economist sept 2005)?
- University(Colleges) for vocational education?

Disruption, incremental or no change at all? The answer depends on which continent you are living. For example MOOC's as a solution for democratization of Ivy League Universities? There are no Ivy League Universities or elite universities on continental Europe. MOOC's as a solution for massification? Well, may be the university of Rome is an example of massification and some Universities in Germany. However, the law in Italy has to be changed in order to make it work.

In the Netherlands we do not have a short term problem with massification of our universities. Staying with the Netherlands for a moment. Universities budgets are sponsored for 90% by the taxpayer and what are or will be the priorities? With soaring costs of healthcare and welfare the universities have to be prepared for a major change in a negative sense of their budget. Not to mention demographic changes. Politicians have to reconsider the redistribution of taxpayers money since taxpayers are not willing to bear the brunt. So the change will be disruptive since there are on the short term no other sponsors for the budget. Consequently tuition fees have to be increased and faculty will be reduced. That is why MOOC's could be a helpful instrument. But caveat MOOC's. The critical remarks of Craig give insight into the do's and don'ts of MOOC's.

In addition we have to consider the market. I.e. demand for education by students, demand for vocational training by companies, demand for college education by companies, institutions and so on. Is there just a latent non-articulated market or is everything just fine with respect to supply and demand?

However, there is still the question: What are universities for(Collini)?

In addition, it is worthwhile, to consider the analysis of Bloom(1987) about the same question. Reading both authors we could conclude, there are no universities at all. We created just training institutions.

Question to be answered indeed. Why do universities have tenure tracks? Why are young scientist forced to spend much of their research time on trying to be successful in gathering grants? In this way Universities are creating a kind of group thinking about en vogue research. Not a way to support revolutionary research (Smolin). It is almost a strait jacket. Not a way to educate young people. Not a way to become an attractive university. Freedom of inquiry must be renewed.

“No, nothing of importance is given for free; we have to build, to create, to construct; that's why homo faber is the most “fitting” title for our species” , Ortega y Gasset.

When reflecting on Research and Development I like to recall the statement of Vannevar Bush, the godfather of the National Science Foundation, who knew a thing or two about Research:

“The distinction between applied and pure research is not a hard and fast one, and industrial scientists may tackle specific problems from broad fundamental viewpoints. But it is important to emphasize a perverse law governing research: under pressure for immediate results, and unless deliberate policies are set up to guard against this, applied research invariably drives out pure.

This moral is clear: It is pure research which deserves and requires special protection and

special assured support”, Vannevar Bush. And Bush continued : “*The publicly and privately supported colleges, universities and research institutes are the centres of basic research. They are the wellsprings of knowledge..... and their scientist are free to pursue the truth wherever it may lead, there will be a flow of new scientific knowledge*”.

Lederman made the following statement: “*Most of the major advances in technology that have influenced the quality and quantity of life have come out of pure, abstract, curiosity-driven research. Amen*”.

To conclude this section, I cite Isaacson’s *Einstein His Life and Universe*:

“*Had he been consigned instead to the job of an assistant professor, he might have felt compelled to churn out safe publications and be overly cautious in challenging accepted notions. As he later noted, originality and creativity were not prime assets for climbing academic ladders, especially in the German-speaking world, and he would have felt pressure to conform to the prejudices of prevailing wisdom of his patrons. ‘an academic career in which a person is forced to produce scientific writings in great amounts creates a danger of intellectual superficiality,’ he said.*” Well, this is about the beginning of the 20th century and Germany. Now, 2019, it applies for the whole academical western world.

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Bijlage : De verkrumelde Universiteit

Iedere student(m/v) vindt natuurlijk zijn of haar universitaire opleiding de enige echte wetenschappelijke opleiding. De andere universitaire opleidingen zijn minder of helemaal niet wetenschappelijk. Is dat juist, hoe meet je dat en wat betekent het eigenlijk? Wanneer gaat een universitaire opleiding over in een hogere beroepsopleiding?

In de tweede helft van de 70er van de vorige eeuw zat ik regelmatig met prof. Dr. R. Timman op vrijdagmiddag om de tafel en bespraken we, onder het nuttigen van een kop soep in huize Noordzij, de Nederlandse universitaire wereld. Prof. Timman was in die tijd adviseur van het Marin en klopte regelmatig zijn pijp uit in onze woonkamer. Ik was werkzaam in de research bij het Marin. Eén van de terugkerende items bij het genoemde onderwerp was het belang van het maken van keuzes om Nederland op te sturen in vaart der universiteiten. Keuzes die uiteraard samenhangen met de kwaliteit van het Nederlandse universitaire onderwijs. Prof. Timman had daar, als nestor van de opleiding tot wiskundig ingenieur(Delft), zeker wat over te zeggen. Hij was er voor om het aantal universiteiten in Nederland te beperken en één van de universiteiten aan te wijzen als top universiteit. Om dat de UT(toen nog THT) jong was, ongeveer 10 jaren, was dit een universiteit met nog weinig ingesleten gewoontes en dus het meest geschikt om de ontwikkeling tot topuniversiteit te kunnen volbrengen. In ieder geval voerden wij de gesprekken in een tijd dat bedrijfskunde nog een kopopleiding was van een natuurwetenschappelijke opleiding. Waar staan we nu? Beide vragen: “Waar staan we nu” en “Is elke universitaire opleiding een wetenschappelijke opleiding” zijn onderwerp van reflectie in dit essay(probeersel).

De universiteit is één van de oudste instituties van de wereld. De eerste echte universiteit werd gesticht in Bologna in de 11^e eeuw. Die te Parijs en Oxford in de 12^e eeuw. De oude instituten en duizenden volgers groeien en bloeien in onze eeuw. De universiteiten zijn veranderd maar niet veel. Zeker niet tot in de 19^e eeuw. Daarna zijn er duidelijke veranderingen op getreden samenhangend met het massa onderwijs en de financiering daarvan uit de publieke middelen. Ook wordt nu vaker een beroep gedaan op private middelen zoals Cambridge dat heeft gedaan door samen met Microsoft een computer-science laboratorium op te zetten. Een andere belangrijke verandering is, naast de financiering, het genoemde massa onderwijs. De groei naar massa universiteit dekt de behoefte aan een universitaire opleiding als paspoort voor een goede baan.

De vraag naar een universitaire opleiding is zeker niet gelijk aan de vraag naar een wetenschappelijke opleiding. Wel is er een samenhang tussen de vraag naar een universitaire opleiding en de behoefte aan een universitaire titel. Hier ligt misschien al een sleutel om tot de beantwoording van de eerder gestelde vragen te komen.

De behoefte aan goed opgeleide mensen is een gegeven. We hanteren daar begrippen voor als kennis samenleving en/of kenniseconomie. Begrippen gemunt door Peter Drucker in 1957. De universiteiten zijn daardoor belangrijke activa geworden van een land. Investeren in kennis heeft ook politieke belangstelling gekregen. Of dit leidt tot relevante keuzes is een

vraag die ontkennend beantwoord kan worden. Er worden geen keuzes gemaakt, zeker niet in Nederland. Een topuniversiteit is er niet gekomen. Alle universiteiten zijn even belangrijk en eten alle uit dezelfde financiële ruif. Toch wordt van de universiteiten verwacht om als incubator te fungeren in het nationale innovatie proces. Maar hoe kan de universiteit deze rol waarmaken als ze naast haar wetenschappelijke rol ook moet voldoen aan de vraag naar massaal universitair onderwijs? Studenten aantallen zullen blijven groeien. Betekent deze groei dat de kwaliteit van de opleiding zal afnemen? De vraag stellen is de vraag beantwoorden. De afname in kwaliteit was niet nodig geweest als er tijdig keuzes waren gemaakt. Natuurlijk is er gekozen. En hoe! Door niet te kiezen, hebben we voor de polderuniversiteit gekozen. "Geen gezeik, elke universiteit is gelijk". Een bekende parafrase. We leven in Nederland onder de misvatting van gelijke kansen. Gelijke kansen bestaan alleen als we allemaal gelijk zijn. We hebben hooguit gelijke rechten en plichten.

Iedereen naar de universiteit? Prima, maar dan moeten we de universiteit opnieuw uit vinden. Dat wil zeggen: diversificatie in het tertiaire onderwijs. Dat hadden we al, dus laten we er snel naar terug gaan: **een goede beroepsopleiding(HBO) en een wetenschappelijke opleiding**(zoals geformuleerd door Humboldt). Allemaal dezelfde titel en het bedrijfsleven honoreert beide opleidingen even goed. Ziet het bedrijfsleven daar het belang van in? Zal dit allemaal gebeuren? Wat we nu zien is "academic drift". De universiteit wordt richting HBO gedwongen en de HBO gaat richting universiteit. Beide leveren niet meer wat maatschappelijk gewenst is. Dit blijft wringen en zal zeker niet veranderen als het tertiaire onderwijs nagenoeg gratis blijft.

De verkrumelde universiteit, wat wordt er mee bedoeld? Ik wil ermee verduidelijken dat door massa onderwijs de universiteit elke mogelijkheid zal benutten om studierichtingen te verbijzonderen. Al was het maar om de HBO de pas af te snijden bij haar academische ambities (academic drift). Zo kan men zich voorstellen dat bedrijfskunde 50 jaar geleden een onderdeel van de werktuigbouwkunde was. Nu is dat niet meer zo. Waar leidt dat toe?

In den beginne was er de universitaire opleiding met een drietal, later en zevental, richtingen. Hoe meer deze richtingen opgedeeld(verbijzonderd) worden, des te groter de kans dat een deel wetenschappelijk blijft en een deel minder wetenschappelijk wordt. De aanzet voor "academic drift". Dit proces versterkt de HBO's in hun idee dat ze ook universiteiten zijn en gaan zich als zodanig manifesteren. Er is geen enkele noodzaak dat dit zou moeten gebeuren. En toch gebeurt het. Hoe kan dat? Het ontbreekt aan politieke wil om hier wat aan te doen. De overheid(dus de belastingbetaler) doet alsof zij de koers bepaalt, maar de overheid betaalt slechts. In grote lijnen blijven de instituten hun eigen gang gaan. Franz Schnabel (1937) formuleerde het als volgt: "De universiteit, die kennisfragmenten verdeelt onder rivaliserende faculteiten, waar die kennis verder wordt ontleed door gespecialiseerde professoren, die zich hullen in opzettelijke duisterheid."

De universiteit van vandaag en morgen zal onontkoombaar naar het HBO -niveau bewegen. Er zal geen duidelijke beroepsopleiding en geen duidelijke wetenschappelijke opleiding meer zijn. Ondanks de eerdere verzuchtingen om juist wel voor deze scheiding te zorgen.

Helaas, hoe wetenschappelijk de opleiding ook geleken heeft, het zal steeds minder wetenschappelijk worden. Wat te doen? Stimuleer dat de delen van de opleiding welke veel meer bij de beroepsopleiding horen ook daar worden ondergebracht. Dit zal echter een zinloze handeling blijken wanneer de hogere beroeps opleiding steeds meer naar de universitaire opleiding verschuift. De eerder genoemde "academic drift".

Hoe het wetenschappelijke vaandel toch hoog te houden? Door:

- Vragen te blijven stellen. Resultaten van onderzoek zijn altijd prematuur. Anders is er sprake van een uitvinding.
- Het wezenlijke van het onwezenlijke te onderscheiden.
- Onbevangen tegenover het nieuwe te staan.
- Integriteit in de methode te hanteren en de resultaten te communiceren.
- Met de methodische benadering van de wetenschap(paradigma, theorie, experiment toetsing en een paradigmaverschuiving) in problemen door te dringen.

Franz Schnabel (1937). "Deutsche Geschichte im neunzehnten Jahrhundert".

Peter Drucker (1957). "The landmarks of tomorrow".

Spiegelbeeld (1969). "Situatierapport campusbestuur drienerlo".

The Economist (1997). "The knowledge factory".

The Economist (2005). "The brains business".