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# The Evaluation Carrousel: an Assessment Tool for Interdisciplinary Science Innovation Education

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## 1. Introduction

The majority of new technological developments and derived products are results of interdisciplinary science and interdisciplinary science application. From a viewpoint of the more 'classical' research methodology and education methodology the interdisciplinary science scholarship is regarded as a mythical and misty activity. Also in university ranking systems and in university research programs interdisciplinary science education is treated in a stepmotherly way.

On the other hand: the European Union (EU) Treaty of Lisbon and the Bologna Declaration lay emphasis on – especially – interdisciplinary science education. Architecture – as an 'interdisciplinary discipline' balancing on the edge of Arts and Sciences – deals from head on with this kind of problems. So the authors of this chapter argue that some recent advances in architecture education can offer 'lessons to be learned'.

Almost by definition, innovative technologies and derived services and products have to be developed in an interdisciplinary way: all kinds of bits and parts from less sustainable products, services, production and realization processes have to be reshuffled in new innovative, sustainable and peaceful ways. This important role of interdisciplinary science invention contrasts sharply with the poor image of it in traditional academic science education. One of the backgrounds of this scientific misunderstanding of interdisciplinary technological science might be the multi-paradigm character of it.

In architecture science education, similar interdisciplinary innovative problems are handled on a daily basis already for already more than 2000 years. The functioning of the Design Studio as a particular education format for this type of education will be briefly mentioned. The main subject of this chapter will be the educational role of the accompanying forms of assessment, especially the Evaluation Assessment Carrousel, which is developed at the Department of Architecture, Building and Planning, Eindhoven University of Technology.

The characteristics of the Evaluation Assessment Carrousel are discussed, among that the high important methodological feature of dealing with two different assessment levels:

- The clash of different conceptual ideas.

- The further technical detailing of these ideas.

The functioning of the Evaluation Assessment Carrousel will be illustrated true a real event: The Evaluation Assessment Carrousel of the festal closing of the autumn semester 2008-2009. Finally, conclusions will be drawn regarding the benefits of the Evaluation Assessment Carrousel for mono-disciplinary as for multidisciplinary education as well.

## **2. Urgent Necessity for European 'Interdisciplinary Science Innovation Education' and some dimensions of it**

To encounter the intensifying competition of the Global Economy, the Lisbon Treaty of 2000 and the new start of this Lisbon Treaty in 2005 want to secure our European standards of living by increased emphasis on high developed products and services. An important role is foreseen for university education, especially technology and innovation (EU, 2005). The nowadays Financial Crisis lays still more emphasis on stimulation of economic growth true education, research and innovation, although National Government economic rescue plans tend to fall back on their more traditional economies.

In addition - as we all know - 'Global Climate Change' also covers world wide all our artificial processes and assets: agriculture, mining, industry, infrastructure, transport, services, energy, buildings and houses. The IPCC report 'Climate Change 2007; Mitigation' (IPCC, 2007) examples the vast dimensions of the problem. It discusses a large number of possible measurements against Climate Change, divided in different economical sectors: energy supply, transport, buildings, industry, agriculture, forestry and waste management. All mitigation measurements are expressed in Equivalents Giga Ton CO<sub>2</sub>. All in a global perspective and also for every measurement the rate of certainty and uncertainty is given. It is only an interim report and only covers the problem of CO<sub>2</sub> emission and reduction, but it already needs more than 800 pages! Regarding the nowadays oppressive, upsetting, interrelated and global problems, a necessary 'Green Innovation' also needs a new inspiring, dynamic innovation mechanism what appreciates the interwoven, economy driven - but also moral driven (to provide serious world wide conflicts) - aspects of it.

So traditional educational programs, which already break adrift of their traditional technology-driven course, due to the Bologna Declaration (EU, 1999) introducing the Bachelors - Masters System, again and again will have to re-orientate themselves towards more market-driven interdisciplinary innovative directions.

## **3. In Contrast: the Poor Image of Interdisciplinary Technological Science Education**

The relatively poor image of interdisciplinary technological science education is in sharp contrast to the new European Union (EU) emphasis on technological innovation.

By tradition, Universities of Technology are gathered around the leading mono-disciplines mathematics, physics and chemistry. These are the most important departments of the Universities of Technology. They 'own' the bulk of the hardware of the university: the main frame computers, the laboratories, libraries, prototype plants, and so on. Also a large part of the different educational programs are taken by these main departments. So the gather the main part of the annual budgets and it seems that these departments also deliver automatically the Rector Magnific of the Universities of Technology as well.

In governance research funding there is also hardly any place for multi-disciplinary science research. In the boards, which have to assess future research programs for possible future funding, the mono-disciplines are in the majority. Sometimes it is even not possible to get a multidisciplinary research proposal through the first assessment round.

Also in the governance educational quality assessment cycles multidisciplinary departments always have to explain their most basic principles of their education programs and research activities to the mono-discipline assessors from the rivaling mono-discipline departments. So it seems hardly impossible to gain a real recognized position. In coherence with this, interdisciplinary departments are very vulnerable for reorganizations. When universities have to cut their budgets, the traditional mono-discipline departments always seem to be in favour, while multi-disciplinary departments have to be totally reshuffled most of the times: their staff, their faculties, their educational programs, their research programs.

#### **4. An overall Methodological Aspect of Interdisciplinary Science Application: a Rivalry of Theories and a Rivalry of Conceptual Ideas**

One of the backgrounds of this scientific misunderstanding of interdisciplinary technological science might be the multi-paradigm character of it. The more classical relationship between the academic theoretic development of science and the technological utilization of science leads to an almost algorithmic relationship. Basic scientific research is beneficial to the academic theoretic development of science and is addressed to falsification of parts of new theory accordingly to the empirical cycle. The technological development usually takes place at universities of technology and uses all kind of theory as application. These applications have far most an algorithmic form with standardized formulas and well known rules of application. These standardized formulas and well known rules of application form steady guidelines for academic educational assessment.

In interdisciplinary science application - where architecture is gathered - there are several fields of science and several - usually not compatible - theories. Instead of the almost algorithmic relationship between theory and utilized technology, there is in interdisciplinary science a rivalry between theories and in the innovative application of these theories: a rivalry of conceptual ideas. Kuhn - the 'founding father' of scientific paradigms - states that in classical theoretic science the paradigms can only exist one after one other (1st paradigm - clash of paradigms - 2nd paradigm - et cetera) (Kuhn, 1962). Kuhn him self states that architecture is an exception to this rule: in architecture more than one paradigm can be valid at the same time (Kuhn, 1970). After all, in architecture every rival conceptual idea has through its own expressed specific style, comfort, structural system, materialisation, detailing, specific architectural history, specific architectural theory, etcetera its own technical and scientific setting.

#### **5. Architecture as outstanding example for Interdisciplinary Innovation Education**

Architecture can be an outstanding example for interdisciplinary technological development, as it is an 'interdisciplinary discipline' balancing on the edge of Arts and Sciences - what deals from head on with interdisciplinary design and development problems. Already the Roman Architect Vitruvius, who has written the first known

professional book series about Architecture: his well known Ten Books on Architecture (Vitruvius, *De Architectura/On Architecture*), lays emphasis on the interdisciplinary character of Architecture. The architect has to have knowledge of almost all the existing sciences of those days: writing of treatises, drawing, sketching, geometry, optics, arithmetic, architectural history, philosophy, music, acoustics, medicine and metrology, astronomy, law, economics, and earth sciences.

Vitruvius in Book I chapter 1: The Education of the Architect

Verse 1: 'The Architect should be equipped with knowledge of many branches of study and varied kinds of learning, for it is by his judgement that all work done by the other arts is put to test. This knowledge is the child of practice and theory. Practice is the continuous and regular exercise of employment where manual work is done with any necessary material according to the design of a drawing. Theory, on the other hand, is the ability to demonstrate and explain the productions of dexterity on the principles of proportion.'

Verse 2: 'It follows, therefore, that architects who have aimed at acquiring manual skill without scholarship have never been able to reach a position of authority to correspond to their pains, while those who relies only upon theories and scholarship were obviously hunting the shadow, not the substance. But those who have a thorough knowledge of both, like men armed at all points, have the sooner attained their object and carried authority with them.'

Regarding to Pytheos, who said that the architect should be leading top-class on all those different Arts and Sciences (Vitruvius, Book 1, prologue, verse 12) Vitruvius comments that that is virtual impossible. Vitruvius points out to Pytheos that all Arts and Sciences are composed of two things: the actual craft work and the theory of it (ibid, verse 15): 'The actual undertaking of works which are brought to perfection by the hand and its manipulation is the function of those who have been specially trained to deal with a single art' (ibid, verse 16). 'The theory is shared with other scholars' (ibid, verse 15), because 'in all sciences many points, perhaps all, are common so far as the discussion of them is concerned' (ibid, verse 16) (logic and methodology). It appears, therefore, that he has done enough and to spare who in each subject possesses a fairly good knowledge of those parts, with their principles, which are indispensable for architecture that he is capable to pass judgement and to express approval in the case of those things or arts (ibid verse 16).

The Ten Books of Vitruvius are well known for their strong technical theoretical fundamentals and for his introduction of the human proportions as a frame to the whole: the famous Icon of men standing in the centre of both square and outer circle. Some parts of the ten Books also handle fresh water systems, sewerage systems, fortification of cities and also big weaponry construction to besiege fortified cities, so he was a Civil Engineer and Mechanical Engineer as well. And in a certain way of speaking: an 'unsuspected technician'. But, to point out some origin, perception and cultural meaning to architecture, he also uses a kind of literary prose with partly historicized, partly theological, partly mythical origins. For example the mythical origin of society, living together and building (book 2, chapter 1) and the origins of the 'classic orders' in warriors, gods and goddesses (book 4, chapter 1). So he also knows how to market his architectural products and give these cultural, religious, esthetical and literary 'brands', what makes him in the eyes of nowadays 'hard core technicians' an holistic, non-rational suspect again .



The discussion between Vitruvius and Pytheos refers to the key issues of multidisciplinary innovation education: how to educate such a broad scale of disciplines and how to assess the results of this education ?

## 6. Design Studio and Design Studio Assessment

From times in immemorial student focused learning in so called Architectural Design Studio's takes up an important part of the educational programme of architectural education (on university level: 30 to 70 percent of the programme, dependent of the year of study). The Design Studio can be described as a kind of Master Class Education and consists of some 12 to 15 students and - in most cases a professional - Master. In the Design Studio's students work on so called 'open-ended' and 'ill-structured' design assignments. Students present their work continuously and the Master responds to it out of his academic and professional habitat.

Important parts of the Design Studio Education are the assessments: the so called 'Critics'. Half way and at the end of the studio period (mostly a semester) the student has to defend his design 'in public' in front of the rest of the students, a committee of teachers and other professional and / or academic experts. These 'Critics' can be regarded as a 'notorious weak point' in today Design Studio Education. The 'Critics' cost a lot of - scarce - education time (a half to a whole day per Design Studio Group in the Masters), gave a lot of fear to the most of the students and are ineffective to give substantive feedback to:

- The design.
- The design reasoning.
- The oral and visual presentation techniques.

The basic principles of the Design Studio originate in the Master - Mate Relationship in the Middle Ages. Traditional production was the primary goal of this relationship, but there was also an educational aspect in it. The Middle Age Guild System had also the system of Masterpiece and a Jury System, which decided if the Made could become a Master.

The Jury decided behind closed doors and also in those days the Jury have some objective criteria but also a lot of subjective criteria. Notorious are the historic stories about all kinds of social and economic aspects what influenced the size of the Guilds and the number of Made who become Master.

Each country and language region has his own historical processes from Master - Made Building Guilds to today Architecture Education Institutes. In the Netherlands the first regular form of (very basic) Civil and Building Engineering Education started in the year 1756, when a Nobility Lady left a legacy for orphans to 'learn a decent job and be no longer be a burden for society'. They were educated in mathematics, building dikes and locks, shipbuilding and building (Schilt in Goldhoorn, 1996).

In the year 1817 the government founded a Royal Academy for Art and Architecture in Amsterdam and Antwerp, following the French Ecole des Beaux Arts (ibid). The Ecole des Baux Arts is gradually accepted as the start for modern architecture design education throughout the Western World. For the first time an important part of the architectural education took place through design assignments and design competitions (Grand Prix). They had Design Studio's and Design Studio Masters (both financed directly by the students themselves). Students have to deliver their designs in a fixed time and the designs were assessed through a Jury. Next to the design assignments they also had handbooks and

exams for building technology and structural design (the famous technical handbooks of Durand were both used at the Ecole des Baux Arts and the Ecole Polytechnique) (Kooijman 1995).

However, The Jury Assessment of the Ecole des Beaux Arts took place behind closed doors without any oral presentation from the students. This was also the case for all the following Schools of Architecture throughout the Western World. The closed jury system is gradually evolved since mid twentieth century into an open assessment, where the student presents his design for a Jury and fellow students. The Jury can have tricky questions and all types of unexpected and unwanted and psychological unpleasant comments. Students get undesirable high stress levels, have real black outs, get real burn outs and even worse (Anthony, 1991; Doidge, Sara & Parnell, 2000; Hall Jones, 1996; Wilkin, 1999).

In the USA this form of Jury Critics started in the fifties after the post war democratic wave after the second world war (ibid). In Europe it started after the student movements in the sixties: first in the northern countries, later in the south.

## 7. Educational 'Context' as a Factor

Assumedly due to the organisational context of the Anglo American School systems the Jury Critics systems have their most pure forms in UK and USA. The Critics can be very hard and with a big psychological impact on the students. A great deal of the specific literature about Critics is from Anglo American origin.

In UK and USA there is an extensive admittance exam and procedure before students can start their studies. When you passed the admittance exam of most American Schools you can never fail for an exam: you only get an A, B, C or D level. So critics CAN be hard, because only one bad Critic has no strong impact on the study carrier. And critics MUST be hard because students without any talent at all have to be convinced that is better for them to leave 'by their one's own free will' (when students pass their admittance exam only around 10 to 15 % leaves without successful ending).

The American Schools of Architecture also are strongly focused on only architecture. In the Netherlands the main stream architecture education takes place at Universities of Technology with a broader scope: our Department at Eindhoven University of Technology is named: Architecture, Building and Planning. So a more gradual selection process can take place during the Bachelors in the direction of pure architecture, or a direction with more structural design, or more building technology, or more urban design, etcetera, or: exit. Also students can fail for every exam and there are time-performance related restrictions. So students without any talent at all have the tendency to leave really by their one's own free will (from the first year students only around 50 % get their final degree).

The Jury Critics have such a tied bond with the organisational context of the Anglo American School systems, that the suggestions of change in the Anglo American literature about Jury Critics are all formulated 'inside the Box' and hardly any of the suggestions of change are 'thinking out of the Box':

Kathryn H. Anthony gives in her excellent research rapport more than 30 alternatives to the traditional Design Juries, with as common themes (Anthony, 1991, pages 132-135):

"Increased student participation

- Focus on the design process as well as the design product.
- Clarifying criteria and demystifying design.

- A higher level of learning.
- Not all students need to be present.
- Less tension and no public humiliation.
- Less time.
- Different physical environments and presentation media.
- Experiment and evaluate”.

Other guidelines are (Anthony, 1991; Doidge, Sara & Parnell, 2000):

- Soften it up: give first year students and other Bachelors a more gentle kind of pre-critics.
- Give some training to the first year students for presentation, poster session, etcetera.
- Inform the Jury Members about their potential disastrous psychological impact.
- Try to establish some rules with the Jury Members.
- Give students a lot of tips as way of precaution:
  - Time management for the whole length of the Design Studio.
  - Try to get some sleep in week of the Presentation.
  - Try to eat healthy food in de week of the Presentation.
  - The well-known Presentation tips.
  - Suitable clothing and body language.
  - All kinds of Psychological tips.

Hall Jones and Wilkin go further and make the connection between the marking system of students as one of the functions of the Jury Critics and the poor learning potential of it: much to high stress levels, to incidental and not systematic, no real discussion because of ‘damage control’, etcetera. (Hall Jones, 1996; Wilkin, 1999).

Hall Jones suggested to remove the marking system out off the Jury Critics, so that it can take on a more educational role (Hall Jones 1996). Doidge, Sara & Parnell wonder what else will than fulfil the valid functions of the traditional Jury Critics. And: does the Jury Critics than just will be a kind of tutorial? ( Doidge, Sara & Parnell, 2000, page 69).

## 8. Thinking Out of the Box

The Department of Architecture, Building and Planning of the Eindhoven University of Technology is much broader than only architecture and it is also focussed on more than one architectural main style. This broad approach has resulted in the development of Design Education Systems (Proveniers, 2005), Collaborative Design Systems (Schmid & Pa’l, 2002) and Design Assessment Systems which are specially focussed on interdisciplinary design and development and therefore methodological very suitable for interdisciplinary science innovation education.

The Design Assessment System: the Evaluation Assessment Carrousel, is addressed to an open assessment and further development of already conceptual developed designs by professional experts. The Evaluation Assessment Carrousel does not bear that burden of typical Anglo American organisational context, so it can focus on new innovative aspects of future architecture education and even beyond that: basic backgrounds of interdisciplinary science cooperation for innovation.



## 9. Basic Principle of the Evaluation Assessment Carrousel and 'Full Carrousel'

The basic principle of the Evaluation Assessment Carrousel can be best explained with a very simple variant in which four innovators simultaneously present their innovative ideas in the four corners of a hall. There are also four assessors. At the end of the first session the assessors 'turn a quarter of a circle' and the second session of innovators presentations starts. After four sessions the assessors 'have made a full circle', but of course this still isn't a real carrousel!

It really gets beneficial – and also exciting – when you scale it up to 20 or more innovators with 10 or more parallel innovator presentations and you also make a random mix up of the Assessors. Several different types of scheduling are possible, so that all innovators present their work 2, 3 or 6 times and the assessors make a double number of 'Carrousel turns'. Each presentation takes some ten minutes. After one round each student has 'a time-out' of one round, to make a few notes regarding additional comments and ideas.

## 10. Benefits of the Evaluation Assessment Carrousel

The benefits of the Evaluation Assessment Carrousel are:

- It frees the so feared traditional Jury Critics from its 'darker side' and makes it a motivating and inspiring happening.
- It increases the developmental role: during several presentation rounds innovators learn to make their conceptual idea more complete.
- It gives all the participants the opportunity for a quick scan of quality of the other innovations.
- It creates more insight and involvement by the different academic and / or professional expert guest critics.
- It saves time (and so: also money) from innovators and academic and / or professional expert guest critics.
- It deals with an overall aspect of interdisciplinary science application: a rivalry of theories and a rivalry of conceptual ideas (see next section).

## 11. Assessment of Interdisciplinary Innovative Design: Two Levels

As already stated some sections before: in interdisciplinary science application - where architecture is gathered - there are several fields of science and several – usually not compatible – theories. Instead of the almost algorithmic relationship between theory and utilized technology, there is in interdisciplinary science a rivalry between theories and in the innovative application of these theories: a rivalry of conceptual ideas.

This rivalry of conceptual ideas - at which each single idea is based on and executed in different technologic scientific bodies of knowledge - demands a special form of educational assessment. This educational assessment needs to deal with two different levels:

- The first level of the clash of different conceptual ideas from different students.
- The second level of the quality of the further execution of each of those conceptual ideas and the technical detailing of it.

So the fear of Doidge, Sara & Parnell that Jury Critics without marking function has hardly any educational assessment function is groundless! The 'Evaluation Assessment Carrousel' addresses itself mainly to the level of competing conceptual ideas. During several presentation rounds students learn to make their conceptual idea more complete, as they learn from comments from the mix of different academic and / or professional specialists. Design Studio teachers use it as a quick scan of quality of the other Studio's and for the other guests it leads also to increasing commitment. Students can use this experience later on the day, when they present their design to their Design Studio teachers. The teachers also take in to account the second level of interdisciplinary innovative design: the execution of the idea and the technical detailing. After all the presentations, when the students have left the room, the teachers can study drawings, written presentations, etcetera and give the marks.

This two level assessment model corresponds also with scientific insight in educational assessment. Moerkerke and Dochy distinguish two basic forms for the educational assessment for complex academic competence:

- Holistic assessment methods what in this case can be used for the ranking of competing conceptual ideas.
- Rational (checklist) assessment methods what in this case can be used for ranking of the further execution of the conceptual idea and the technical detailing of it.

Moerkerke en Dochy conclude that for the educational assessment for complex academic competences a mix of both is used (Moerkerke & Dochy, 1997). The resemblance with the answer from Vitruvius to the remarks of Pytheos is remarkable: a distinction between conceptual ideas and refined technical detailing of these conceptual ideas!

## **12. The Carrousel in Full Action: the Festal Closing of the Autumn Semester 2008-2009**

In the night preceding the Evaluation Assessment Carrousel students make their last preparations to their posters, models and oral presentations. The electronic lock system of the building is already activated and some of the students are too late and they wait inside the door till a 'lost' faculty with an electronic key leaves the building and they also can slip away.

An other student in architecture sits with his fellow housemates: students from other departments in their favourite student-pub. For the final time he tries to explain to them where his concept is all about. He draws it at the back site of a beer mat and this time he is so successful in image it in words and views, that he decides to take the beer mat with him to the next days Carrousel!

It is early morning of Friday 19<sup>th</sup> of December 2008. It is a dark and cloudy day and the lights of the Christmas tree's in the hall of the department building enlightens the first students to arrive to put their posters and models at the most eye-catching spots on the 4<sup>th</sup> floor. Later the dean arrives, who is in charge of the Carrousel and also the Design Studio teachers and the first guests critics who want to have a first preview to be better prepared. There is a light excitement in the 'Atelier': Four Pre-Master Design Studio's with students who finished a kind of Bachelor Degree else were and want to do their Masters in Architecture in Eindhoven. So for them it is a kind of admittance assessment for the Masters

(regular Eindhoven Bachelors have ‘free access’ to the Masters). For the Design Studio teachers there is also some excitement: it is more or less a kind of assessment for them to. The four weeks project was about the rearrangement of a large square in one of the formal villages, what now form Eindhoven: an urban conglomeration of 15 km by 15 km. In the facades of the square and also in the neighbouring streets, are stores with more than local customer interest – although it is not the city centre of Eindhoven. That’s why the square is used as parking place, but not at Saturday, when there is a well-known large food and merchandise market at the square, with opportunity to purchase nice deals, because it is nearly Sunday (in the Netherlands shops are closed on most of the Sundays). There are all kinds off multi-cultural fast food and to visit it, is a special kind of fun shopping. Students analysed the square and surroundings, developed conceptual ideas for the rearrangement of the square and bits of facade (first level of innovative assessment). They also made the further detailed design of one of the new buildings (second level of innovative assessment). Beside academic and / or professional Guest Critics, the dean has arranged a film crew who -temporary - places an impression of the designs and the Evaluation Assessment Carrousel on a local neighbourhood internet page and also citizen are invited. There is a growing excitement when starting time is near... To organise this all could be a hell of a job, but not when you use a smart open ended scheme!

Design Studio Assessment Carrousel Organisational Scheme

	1	2	3	4	5	6	7	.	14
1	A		G		D				
2	B		H		E				
3	C		I						
.									
33		A							
34		B							
35		C							
36							et cetera		

- 1 .. 14:    *Presentation rounds*
- 1 .. 36:    Students
- A, B, C ...    Critics
- X,Y,Z    ‘Mystery Guest Critics’

When a student arrives, his or hers name and number are put on a screen on the wall and he or she gets the Carrousel Scheme. He or she receives a big paper sheet with on it his or hers number of arrival (1...36). He or she puts his / hers paper sheet on top of his / hers Poster presentation.

When a Critic arrives, his or her name and character are put on an other screen on the wall and he or she gets the Carrousel Scheme as well. He or she receives a big paper sheet with on it a character (A ...Z).

The Carrousel Scheme is ‘instant put together’, so ‘the Carrousel can ‘turn and turn’ even when students and Expert Critics are coming late or don’t show up at all.

The dean sounds the gong and the first round starts. It is still not at ease and the paper sheets with numbers and characters function as a kind of 'meeting point device'. When the dean observes that a number of discussions are in a finishing stage, he sounds the gong for the second round. He may 'play' with the time to establish different educational and communicational goals. Students have one round off, so they have some time to write things down and adjust their presentation. Or later on: to listen to fellow students.

After two hours turning of the Carrousel, the Critics were invited to a lunch, also for an informal evaluation. In the afternoon the 'one to one' student – teacher assessments took place where marks and / or 'strong advices to leave' were given.

Afterwards, a drink for staff and students, a final emotional release and the end of the semester is near .

An Impression of this Design Studio Assessment Carrousel was for a couple of months available at: [www.citytv.nl](http://www.citytv.nl) , so citizens, other professional experts and local politicians could also benefit of the expertises.

### 13. Conclusions and Discussion

This study examined the possibilities for the Evaluation Carrousel to function as an assessment tool for by the European Community stimulated interdisciplinary science innovation education. The particular position of interdisciplinary science innovation education is comparable with that of academic architecture education: a two millennia old discussion between Vitruvius and Pytheos refers to the key issues of multidisciplinary innovation education: how to educate such a broad scale of disciplines and how to assess the results of this education?

The functioning of the Design Studio as a particular education format for this type of education was only mentioned briefly. The problem of the assessment was placed in its educational context:

- In more single-paradigm, mono-discipline, rational approach Schools of Technology traditional assessment methods as 'Design Critics' will be used.
- In more multi-paradigm, interdisciplinary, mixed holistic and rational Schools of Technology the Evaluation Assessment Carrousel can be used.

The Evaluation Assessment Carrousel tackles a problem what occurs by interdisciplinary science innovation: the presence of two different assessment levels:

- The level of the clash of different conceptual ideas from different students.
- The level of the quality of the further execution of each of those conceptual ideas and the technical detailing of it.

Basically, this multi-paradigm issue and this two level assessment issue can be regarded as the modern version of the two millennia old discussion of Vitruvius and Pytheos again: the equilibrium between a single paradigm mono-disciple approach and a multi-paradigm multi-disciple approach.

The Carrousel is an excellent assessment tool for particularly the first level:

- It provides a quick scan for Design Studio Teachers for quality of interdisciplinary innovative competing conceptual ideas.
- It functions also as an additional educational tool: the 'on the job training' for students to complete their creative conceptual ideas.

So - in a wider scientific educational perspective - the Evaluation Assessment Carrousel can serve as a suitable educational assessment model for other innovative interdisciplinary science practise, if this practise leads to a rivalry of theories and a rivalry of conceptual ideas.

The Evaluation Assessment Carrousel already turns over more than 15 years at the Department of Architecture, Building and Planning at Eindhoven University of Technology. The educational aims are sharpened and organisational problems were tackled true the development of the flexible organisational scheme.

New 'out of the box thinking' applications are:

- The use as a kind of admittance assessment for the Masters, since the activation of the Bachelors Masters system from the Bologna Declaration, as described in a preceding section.
- The use as a 'bonding device' since the Faculty grows apart also since the start of the Bachelors Masters system
- The use as a 'start up' for scientific assessment of education and/or research of the department by governance committees.

The Evaluation Assessment Carrousel will enlighten the multi-paradigms and multi-concepts character of multidisciplinary technological education for all participants of the Carrousel. Even for mono-disciplinary scientists and mono-disciplinary assessors in governance educational quality reviews and governance research quality reviews as well! Especially when they are familiar to the problems, themes and subjects which are handled in that particular Evaluation Assessment Carrousel.

Referring to the differences between (most) American Schools of Architecture and the broad based Department of Architecture, Building and Planning at Eindhoven University of Technology, the Evaluation Assessment Carrousel can also bridge the gap between single paradigm, mono-discipline, pure rational approach Schools of Technology and multi-paradigm, interdisciplinary, mixed holistic and rational Schools of Technology. Annual or semester based, the Evaluation Assessment Carrousel gives students a glimpse in a multi-disciplinary environment, to give them a glimpse in their multidisciplinary future World ?

## 14. References

- Anthony, K.H.,1991, *Design Juries on Trial; the renaissance of the Design Studio*, New York, Van Nostrand Reinhold.
- Doidge, C. Sara, R. and Parnell, R. Parsons, M. (Cartoons), 2000, *The Crit; an Architecture Student's Handbook*, Oxford, Architectural Press.
- EU, 1999-06, *The Bologna Declaration*
- EU, 2005-04, *Mobilizing the brainpower of Europe: enabling universities to make their full contribution to the Lisbon Strategy*.
- IPCC: Metz, B., Davidson, P.R., Bosch, P.R., Dave, R., L.A. Meyer(eds) (2007). *Climate Change 2007: Mitigation; Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Chance*, IPCC), Cambridge (UK) and New York, Cambridge University Press.
- Goldhoorn, B., 1996, *Architectuur als discipline*, Rotterdam, Nai Uitgevers.
- Hall Jones, S., 1996, *Crits; an examination*; In: *Journal of Art and Design Education*, 15 (2), 33-141.



- Kooijman, D., 1995, *Wortels van het Architectuuronderwijs*, Delft, Delftse Universitaire Pers.
- Kuhn, Thomas S., 1962, *The Structure of Scientific Revolutions*, Chicago, University of Chicago Press, 1970 (2<sup>nd</sup> edition).
- Kuhn, Thomas S. 1970, *Comment on the Relations of Science and Art; Comparative Studies in Society and History*, Chicago, University of Chicago Press.
- Moerkerke, G. and Dochy, F., 1997 *Het toetsen van complexe vaardigheden* (pagina 232) In: ten Dam, G., van Hout H.,
- Terlouw, C. & Willems, J., 1997, *Onderwijskunde Hoger Onderwijs; Handboek voor docenten*, Assen, van Gorcum.
- Proveniers, A.G.W.J., 2005, PhD thesis, 'Leren-Creëren'; een kernstrategie voor het eerstejaars atelierwerk in het universitair bouwkundig ontwerponderwijs. *Bouwstenen 96*, Department of Architecture, Building and Planning, Eindhoven University of Technology, the Netherlands.
- Schmid, P. & Pa'l, G., 2002, *An Attempt to Support Housing and Housing Science by the Method Holistic Participation (MHP) in the Light of Sustainable Development*, in: *The Proceedings of the XXX IAHS World Congress on Housing*, 9-13 September 2002, Coimbra, Portugal, Pedro Bastista-Artes Gráficas, Portugal.
- Wilkin, M., 1999, In: Doidge, C. Sara, R. & Parnell, R. Parsons, M. (Cartoons), 2000, *The Crit; an Architecture Student's Handbook*, Oxford, Architectural Press.
- Vitruvius, *The Ten Books on Architecture*, Translated by Morris Hicky Morgan, 1960, New York USA, Dover publications
- Vitruvius, *De Architectura / On Architecture* Edited from the Harleian Manuscript 2767 and translated into English by Frank Granger, 1955, Cambridge Massachusetts USA, Harvard University Press.

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From 3rd to 5th March 2008 the International Association of Technology, Education and Development organised its International Technology, Education and Development Conference in Valencia, Spain. Over a hundred papers were presented by participants from a great variety of countries. Summarising, this book provides a kaleidoscopic view of work that is done, all over the world in (higher) education, characterised by the key words 'Education' and 'Development'. I wish the reader an enlightening experience.

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