Developing a win-win mentorship-scholarship, higher education model for design through collaborative learning

Artikkelen er vitenskapelig vurdert av forskere utenfor redaksjonen.

Av André Liem

André Liem
Department of Product Design

E-mail: andre.liem@ntnu.no

Abstract

This paper proposes a hierarchical model towards teaching and scholarship with an emphasis on efficient and effective collaborative learning between master and apprentice. At first, the topic collaborative learning will be discussed from a general perspective. After that master-apprentice relationships in professional studies, such as design, will be elaborated upon in Chapter 5.

If a hierarchical master-apprenticeship model is well-planned and properly executed in practice, a win-win situation can be achieved from an individual as well as a collective perspective.

Considerations which are essential for the functioning of the model are:

- *A common scholarly interest to further the field of study beyond traditional learning.*
- *A vision and strategy for knowledge building through large long-term research or development projects.*
- *A well-defined overall research plan on how to organize and segment the large research or development project into smaller ones with intermediate milestones.*
- *A master-apprentice relationship throughout all levels of the hierarchy*
- *Clearly defined roles and tasks among the members within a hierarchical teaching / research unit, aligned to the classification and sub-classification of the overarching research / development project.*

Keywords: Collaborative learning, Mentorship, Scholarship, Service.

1. Introduction

Generally speaking, major items on the agenda for contemporary universities can be formulated as follows (Pan 2001):

- Facilitating knowledge transmission and creation
- Participating in the process of social change and contributing to the community at large
- Equipping individuals with the necessary life skills, which would enable them to function efficiently.

However, in a rapidly changing world, higher education institutions, such as the Norwegian University of Science and Technology

(NTNU), are being put to even higher challenges in the field of teaching, research and administration than stated above. To demonstrate their world-class status, these institutions will be particularly measured by their research quality performance. They are also expected to have demonstrable scholarly practices in place to assure and account for successful student 'higher learning' as a vital aspect of their "raison d'etre'" for being a research-intensive university.

According to Boyer's (1990), *Scholarship Reconsidered: Priorities of the professoriate*, an understanding of scholarship and its practices need to be revitalized if a research university is to be relevant to contemporary society in a complex world. The core of his scholarship monograph was a love of learning, a way of working that nurtured a shared commitment and motivation for the ethic of inquiry and intellectual rigour, to the excitement of speculation, creativity and discovery. Unfortunately, the ideal of such a modern institute of higher learning, based on a symbiotic relationship between teaching and research, is not easy to be realised (Freestone et al., 2003). The cleavage is frequently institutionalised and experienced in unsettling ways at an individual level. According to a collection of reflective stories, Andre and Frost (1997), captured an unwritten instruction issued to new academics:

Your job includes two primary tasks. Task one will earn you an increased salary, will secure your professional mobility, will enhance the reputation of your employer, will result in invitations to attend interesting conferences nationally and internationally, and can be done on a flexi-time basis and at home. Task Two is unlikely to enhance your salary, save your tenure decision, or increase your professional mobility significantly and may, if pursued with too much enthusiasm, undermine these.

However, if task two is neglected for the benefit of task one, the academic's career may be in jeopardy, as his or her immediate duties have been compromised.

This article argues for a synergy rather than a conflict between research and teaching based on a hierarchical master-apprentice model for collaborative learning. Such a synergy is crucial for professional practice studies, because these studies are pedagogical intensive in nature, placing huge demands on the educator's time and effort in terms of one-to-one practice-based tutoring. Once pedagogical and research objectives can be achieved through a rigorous activity of mentorship and scholarship a synergy will be established and time efficiently used. Examples of professional practice studies, where synergy is beneficial are Medicine, Architecture, Law and Design.

2. From problem-based learning to collaborative learning

From a modern historical perspective, problem-based learning (PBL) began in the early 1970s at the medical school at McMaster University in Canada. However, its intellectual history is much older, embracing the question-and-answer dialectical approach associated with Socrates, as well as the Hegelian thesis-antithesis-synthesis dialectic (Rhem, 1998). Until recently the PBL has been a generally accepted approach to learning in mainly medical and professional schools. But slowly the sciences in general have begun taking it up, and even more slowly, the humanities.

PBL is believed to encourage transferable skills, including problem-solving and teamwork.

A study conducted by Carlisle and Ibotson (2005) indicated that there is potential for PBL to be used beyond the more usual clinical scenarios constructed for professional health care education, especially in terms of building research capabilities.

The disadvantage of PBL lies in the fact that a specific problem is focused upon, rather than a broader field of study. In this circumstance, students may have a lack of basic theoretical knowledge of the field of study. From a learning perspective, most students have spent their previous years assuming their teacher was the main disseminator of knowledge. Because of this orientation towards the subject-matter expertise of their instructor and the traditional memorization of facts required of students, many students appear to have lost the ability to "simply wonder about something" (Reithlingshoefer, 1992). This is especially seen in first-year students who often express difficulties with self directed learning (Schmidt, Henny, and De Vries, 1992).

From a teaching perspective, instructors act more as facilitators than disseminators of information. As such, they focus their attention too much on team building, questioning student logic and beliefs, providing hints to correct erroneous student reasoning, as well as resources for student research, and keeping students on task. Because of this role, the initial transfer of foundation knowledge may be lacking (Lewis 1996), whereas in return, the student's contribution towards the discovery of new knowledge may be superficial.

Collaborative Learning is a philosophy comprised of: working together, building together, learning together, changing together, and improving together, which fits today's globalised world. In the international business field, multinationals also have to work together in order to survive, no matter how powerful they are (Wiersema, 2000). Learning is enhanced when it is more like a team effort than a solo race. Good learning, like good work, is collaborative and social, not competitive and isolated. Sharing one's ideas and responding to others improves thinking and deepens understanding (Gerdy, 1998).

In this article, a new research or application-based approach towards education will be elaborated from a collaborative learning perspective, which has its foundations in PBL, but disagrees with its negative aspects. For example learning from a 'good' instructor may enrich student's reasoning capabilities and channel self-directed learning among motivated thinkers (=students) towards more concrete and applicable results. In return, the student's contribution towards the discovery of new knowledge may be unpolished, but innovative.

A collaborative learning model, which will be elaborated in chapter 4 of this article, proposes a mentorship /scholarship approach throughout the entire academic hierarchical structure of a specific discipline.

3. Redefining research, teaching and administration

Benefits of greater synergies between research and teaching have emerged, which are significant for tertiary educators, institutions, as well as funding and reviewing bodies. According to Marsh and Hattie's (2002) case for research-rich teaching, research forms the basis for the content of teaching. Teachers who are active researchers are more likely to be on the cutting edge of their discipline and aware of international perspectives in their field.

Research or inquiry based teaching occurs when these teachers shift the focus of student learning from the acquisition of subject content, of outputs, to involving students in the

disciplinary research processes and activities. A focus on the experience of research, on the discovery process in its fullest sense, with its self reflexive insights, "meaning" making and skill development, brings out the fundamental identity of research with the learning that students experience (Zubrick et al, 2001).

3.1 From Research to Scholarship

Scholarship becomes the interactive link between research and teaching. Teaching activities of the scholarly educator are essential to the success and growth of an academic environment and require appropriate academic recognition. Scholarship in education should be identified, recorded, and assessed as scholarly accomplishments for academic recognition (Wood and May, 2006). This is supported by the following four ingredients of scholarship within an academic scholarly environment (Boyer 1990):

1. *Discovery*: the search for new knowledge and definition of what remains to be discovered.
2. *Integration:* the interpretation of the meaning of knowledge and fact and interconnecting knowledge into concepts and structures.
3. *Application:* the utilisation of knowledge in solving actual problems or altering and evolving knowledge to resolve a problem.
4. *Teaching:* the knowledge transformation to build understanding and flexibility, so that ideas are transformed into usable concepts.

However, for this to occur there needs to be Research-based learning, where academics take an active, scholarly approach to their teaching. They reflect upon their role as learners, using their expertise as researchers, in their interactions with students, to understand how their teaching practices enable students to successfully learn in and contribute to their disciplines, so that they are always empowered and prepared for the complexities of the modern world.

From this research-based learning perspective, the academic adopts a heuristic approach to teaching where the 'apprentice' is encouraged to learn the professional art of research by mind-interaction and joint experimentation with the 'master' (Waks, 2001). This 'apprentice' - 'master' relationship is based on joint acquisition of scientific knowledge in a field of study and usually directed towards a specific problem field.

The benefit of such a relationship is mutual. On one hand, the 'apprentice' in this case, the student, gets direct access to the latest knowledge and ideas of the 'master', in this case, the researcher. On the other hand, the researcher can tap on the student's enthusiasm and energy to assist him or her in the quest for new knowledge.

3.2 From Teaching to Mentorship

According to Brain (1998), good teaching comprises of the following four essential qualities: (i) knowledge, (ii) the skills to convey that knowledge, (i) the ability to make the teaching material interesting and relevant, and (iv) a deep-seated respect for the student. These are complemented by Boyer's suggestion that good teaching is characterised by the same mental rigour associated with research. The scholarship of teaching, in other words 'Mentorship' goes beyond good teaching in terms of mastering the subject and effective delivery. Sach-

deva (1996) sees mentorship as a more global and long term responsibility for development of the apprentice. For many, the mentoring relationship comprises more personal, closer relationships that demand time, commitment and a level of emotional engagement (Bhagia and Tinsley, 2000).

According to Hutchings and Shulman (1999), excellent teaching requires a kind of 'going meta' in which faculty frames and systematically investigates questions related to student learning. Such questions comprises of: the conditions under which it occurs, what it looks like, how to deepen it, and so forth. The objective is not only to improve the faculty's classroom, but also to advance the practice beyond it.

The relationship between master and apprentice is crucial, whereby desirable qualities of the former have been identified as follows: knowledge, enthusiasm, a genuine respectful interest, approachability and friendliness, patience, an ability to challenge and good communication skills (Alvarado et al., 2003), (Goran, 2001), (Gray and Smith, 2000) and (Darling, 1984). Considering the needs of the apprentice, mentoring as a source of learning has become particularly relevant given the boundary-less nature of careers today where changing organizational structures create the need for fast-paced learning (Higgins and Kram, 2001).

Practically, there needs to be a mindset receptive of new ideas and readiness to invest time and effort to continually reflect on practices and to engage in exploring innovative ways of strengthening the teaching, learning and inquiry connection, as well as its outcomes (Pan, 2001).

When integrating mentorship and scholarship, an iterative process of learning and inquiry can be visualised in figure 1. Here, the master initiates the process by developing the research scope and providing the basic knowledge (Stage 1). The apprentice will be gradually introduced to the research activities and absorb the knowledge needed to understand and conduct the research experiment (stage 3). Once the apprentice is familiar with the research, he or she will be able to contribute with new knowledge through additional literature search and experimentation, and attempt to integrate it with the original research scope as set by the master (stage 3). In stage 4 master and apprentice will interact and challenge each other. At this point, it is most likely that new insights, theories and models will be suggested.

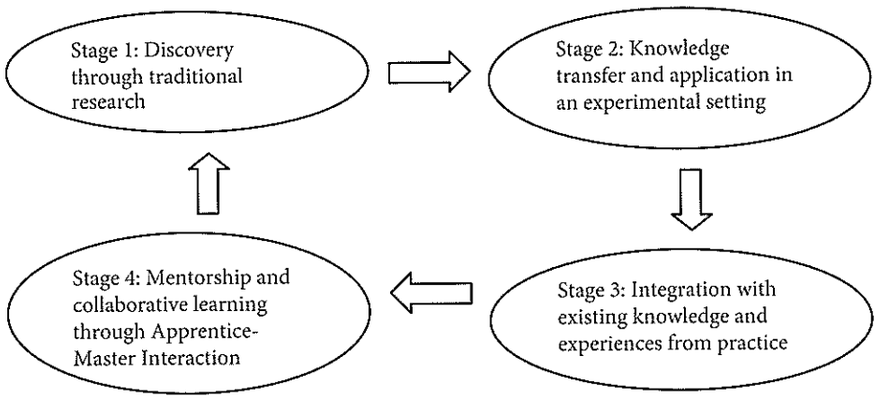

Figure 1. An iterative process of learning, mentorship and scholarship

In line with figure 1, an educational model of apprenticeship is to be recognised by learning through participation in a community of practice, gradually moving from a legitimate peripheral participation to becoming a full member of the profession under the guidance of "masters" of the discipline (Lave & Wenger, 1991; Nielsen & Kvale, 1997). For such a model to work, it is essential that apprentice and master develop a "contract" based on mutual dependency and trust, and their respective status in the "community of practice" (Lave and Wenger, 1991) is derived from each other.

Besides this, some kind of authority is unavoidable in every master-apprenctice teaching practice, as it is inherent in the nature of the situation and that the apprentice is to be provided with the opportunity to learn by means of the master's organisation and arrangement of learning activities. Thus, several theoreticians have pointed out that authority is both desirable and necessary if high-quality teaching and learning are to take place. Peters (1973) puts forward the argument that education should be understood as processes of initiation. He emphasises that learning is not related to the learners' meeting with the "established content" of a discipline or products of knowledge alone, stating that it is equally important for students to be initiated into the procedures and techniques that are crucial in the production of knowledge. Accordingly, this requires that the student be given the opportunity to come close to practitioners who master the procedures defining the discipline.

3.3 From Administration to Service

Within the context of globalisation, privatisation and market-like behaviour in the public sector have led to major changes for Higher Education policy-making and practice (Ntshoe, 2004).

Rigidly administrated knowledge production was previously criticised on the basis of being the product of the nineteenth century industrial society where universities were elitist and the knowledge they produced was linear and compartmentalised into separate disciplines and subjects (Robertson, 2000). It excludes potential actors and creators of application-based knowledge, and denies the existence of multiple sites of knowledge production (Becher, 1989), (Laurillard, 2000) and (Scott, 2000).

On the contrary, in today's global competition, a service attitude has shifted knowledge production to cross-disciplinary, application driven, non-linear and transient, expanding the number of research or knowledge actors (Laurillard, 2000) and (Scott, 2000). Besides this, universities are increasingly losing their monopoly on knowledge production, because new media enables companies, trading in the information industry, to offer "expert" teaching to the growing audiences of higher education. This present situation of knowledge production is characterised by (i) production in the context of its application; (ii) trans-disciplinarity; (iii) heterogeneity in the skills needed for its mastery; (iv) enhanced social accountability; and (v) a broader base of quality control (Kearney, 2000). This means that from a higher educational perspective collaborative learning will be encouraged through partnerships between Universities and industry in the production and distribution of research and that the transformative curriculum should be based on trans-disciplinary activities.

In today's competitive situation, university management is required to take a more proactive approach in promoting and marketing its higher institute of learning, shifting its mindset from administration to service. This mainly includes:

- Undertaking strategic planning activities to acquire large scale research funding throughout all levels of the University organisation.
- Developing collaborative initiatives with industries, the public sector and other higher institutes of learning.

4. Towards a new paradigm of scholarship, mentorship and service for higher education

This new paradigm of higher education is based on the concept of collaborative learning to facilitate a win-win situation among educators, researchers and students. To achieve this, an organised structure of expertise and tasks needs to be established within specific fields of study. The structure need to be hierarchical, because of existing roles and responsibilities of actors within higher institutes of learning, as well as requirements from research councils to establish large, multidisciplinary research projects on the other hand. A general example of such a hierarchy, where there is close collaborative research connectivity throughout all levels, is shown in figure 2.

This systematic and hierarchical collaborative learning model is perceived to be commonly used in institutes of higher learning world-wide. However, within the Norwegian university sector, such a hierarchical system is hard to be realised and supported bottom-up. The root of the issue is that academic hierarchy has been purposely de-emphasised in the past several years. Examples are:

- Department heads and senior faculty have little authority in directing research and teaching among junior faculty members
- The position of Assistant Professor (Amanuensis) in conjunction with the non-existence of a tenure-track system, has been eliminated
- Doctoral candidates carry the status of university staff rather than student.
- Differences in salary between Professor, Associate Professor, University Lecturer and doctoral candidate are minimal.

Instead of an autocratic approach, a win-win construction should be devised to entice sub-ordinate actors to collaborate. The difficulty is a matter of trust, where actors, who are occupied with the ground work of a specific project receive the recognition and new knowledge, they aim for.

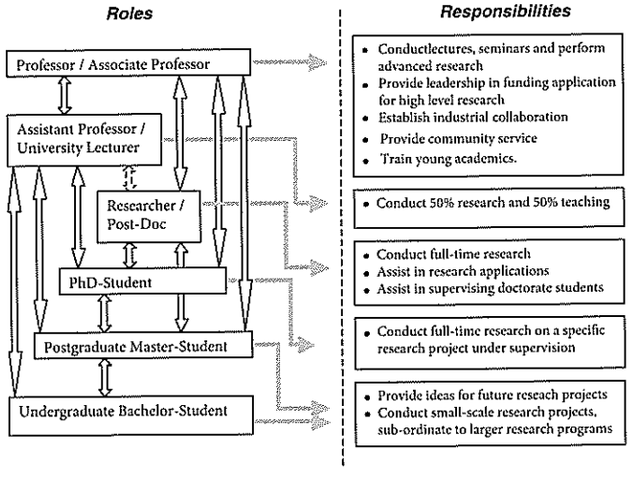

Figure 2. Collaborative learning model: a hierarchical structure towards mentorship and scholarship

5. The importance of scholarship, mentorship and service in professional practice studies

According to The American Heritage Dictionary of the English Language, the term professional refers to a skilled practitioner or expert who is engaged in, and earns a living in a given or implied occupation. The practitioner is required to conform to the standards of a learned profession. Occupations which fall under the category of professional practice are for example law, medicine, architecture, design, etc. To develop and protect these professions, accreditation bodies and organizations, such as The Royal Institute of British Architects (RIBA), The Law Society, Societies of Certified Public Accountants (CPA), The Society of Human Factors and Ergonomics, etc. were established at an early stage.

However, as technology progressed and the quest for knowledge accelerated in the past few decades, the effectiveness of professional organizations in guaranteeing professional protection is questionable. For example in the field of architecture, new materials, building methods and requirements on living have partly transferred design activities towards other professions, diminishing the creative and intellectual authority of the architect. Besides that, according to the Royal Institute of British Architects (RIBA), the title Architect is protected, but the function, i.e. the activity of providing architectural services is not controlled. This means in the worst case that an unqualified individual (not connected to RIBA), who operates under the auspices of another title, e.g. architectural designer can provide the same services. In the medical field knowledge acquisition has been put as a pre-requisite for practice. Unlike in before the 80's, newly graduated medical doctors in the Netherlands have to first obtain a PhD.-degree, before they can enroll in a specialist traineeship, mentored by a senior practitioner (Koninklijke Nederlandsche Maatschappij tot bevordering der Geneeskunst (KNMG), Medische Specialisten registratie Commissie (MSRC)).

According to Maslow's Hierarchy of Needs (1954), needs are arranged from most to least pressing. In order of importance, they are physiological and safety needs, forming category 1, followed by social, esteem, and self-actualisation needs, forming category 2. Services in category 1 are considered to be most indispensable and least subject to criticism. On the contrary, professional services belonging to category 2, are subjected to severe internal competition, a lack of collegiality, and a loss of sense of common responsibility. As a result, related professional organizations were not able to provide the necessary support and protection. Clear examples of professional practices, belonging to this category are usually related to the creative sector, comprising of architectural-, Industrial-, Interior-, graphic design, etc.

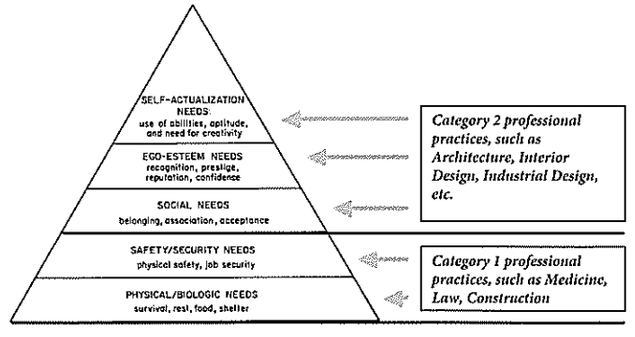

Figure 3. Integrating two categories of professional practices within Maslow's Hierarchy of Needs.

From a scientific standpoint, professional studies are stigmatised as being too practice oriented, without having a mindset towards inquiry and knowledge advancement. This is especially so for professional studies within category 2 which have been experiencing much criticism and a lack of respect from higher learning communities.

Therefore, it is most important that individuals and organisations join forces to establish professional bodies with strong influence and lobbying power. From an university-educational perspective, a structured network of scholarship and mentorship, supported by industrial collaborations, can help to elevate the standing of these professions. The essence of such a network is the existence of a master-apprentice relationship, where both 'master' and 'apprentice', continuously attempt to help each other, challenge and advance their professional field through practice and / or research.

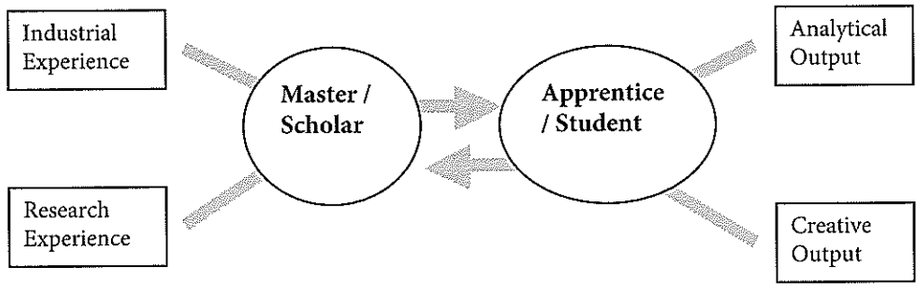

Figure 4, Collaborative learning through information and knowledge flow between master and apprentice

In this win-win situation, the apprentice will gain 'beyond the classroom' knowledge from the mentor, whereas the master receives help in the advancement of his field. Unfortunately, such a learning structure has been criticized from an ethical viewpoint by some educationalists claiming the exploitation of the apprentice, as well as limiting his or her freedom of choice and aptitude towards independent learning. A common Chinese proverb says:

If you give a man a fish, he will eat it and soon be hungry. If you teach a man to fish, he will never be hungry (Chinese proverb).

In the re-interpretation of the above, the next arguments reject these criticisms, but rather support the proverb from a scholarship-mentorship viewpoint as follows:

- Learning from a 'good' master through close interaction within his field of expertise is an invaluable experience.
  - It stimulates and nurtures intellectual curiosity
  - It enables students to become sophisticated thinkers by developing their capacities for critical reflection and independent though 'guided' thinking
- Professional education requires much more effort and time in course preparation, delivery and interaction with students compared to other fields of study, leaving not much time for the educator to conduct research and advance him- or herself scholarly. Therefore, it is justified to persuade the apprentice to practice or search for new knowledge to help the master in meeting his or her research objectives and ambitions.

The following case examples in the field of Industrial Design illustrate how on one hand collaborative learning has been successfully implemented in an Asian educational-industrial context, but on the other hand a lesser successful result was achieved in a Western context.

5.1 Case example A: Collaboration through Mentorship:- A Design Consultancy Service

The case elaborates on past collaborative experiences in mentoring freshly graduated Industrial Designers to pursue an own design consultancy, while capitalising on existing "vendor /supplier – client / end – customer" working relationships.

Previously a faculty member of the National University of Singapore (NUS), the author of this paper decided to involve a promising graduate in his free-lance design activities. Both, faculty member and graduate, did not have the financial means, but had the support of a contract manufacturer, Valen Technologies Pte., to start up a design consultancy, named 'Design Insight' (DI). The collaborative initiative between Valen Technologies and Design Insight was based on a unique win-win concept. Being strongly involved in the coordination and manufacturing of optoelectronic products, Valen Technologies was able to provide his customers with a one-stop design, development and manufacturing service, even up to the design of the packaging. In return, DI was given considerable help in terms of facilities, start-up assignments and manufacturing expertise. The collaboration proved to be successful as both were able to offer a more complete product development service to their end-customers.

Besides Valen technologies, Design Insight managed to build a network of clients, suppliers and collaborators within a period of 2 years, Companies, such as BC2L Pte Ltd, a local OEM dealing with Bluetooth related products, Qbian, a Belgian-based company developing and designing marketing and training materials for Nokia, and Samsung Electronics Co. Ltd in Korea are now part of the network. Presently, the collaboration between DI and Qbian has resulted in 3 business areas: Product Design, Content Development and Visual Communications. The work with Samsung and some local and a US-based ODM, OEMs is still on-going. Overall, the turn-over of DI has doubled on a yearly basis. From 2004 to 2006, turn-over has grown from 70,000 - 400,000SGD (Singapore Dollar), and is expected to reach close to 1 million SGD by the end of 2007.

Presently, the mentor and author of this article still functions as an advisor for DI and benefits is terms of being able to capitalize on resources from DI in conducting his own design activities. Besides this, management of DI felt obligated to mentor senior students from Polytechnics and Universities through a pre-organized internship program.

5.2 Case example B: Collaboration through Vertical Studio Teaching

In collaboration with Tandberg AS, a manufacturer of high-end tele-communication products, three educational projects were launched at the same time but within different levels or modules of the study programme. All projects were completed within the second semester of 2007. The first project was introduced in the final semester (10th semester) of the study as a mater thesis, entitled: "Product Development Process at a High-Tech Norwegian Company". The second project was introduced as a research and design project in the 9th semester, where 2 students investigated how a common workspace for design can be developed within

the context of distance collaboration. The third project was conducted within the context of an industrial collaborative design project, where 2 students in their 7th semester were investigating "High-end tele-collaboration solutions for the oil and gas industry".
The educational purpose of letting the projects run in parallel, was to explore whether the students shared information across projects, as well as whether more senior students were willing to mentor the less senior ones.

Unfortunately, students only had brief informal interactions across projects. Although, there were common objectives to be found in the projects, none of the project groups were convinced that collaboration, sharing of information and division of task would have mutually benefited their projects. However, this case example does not indicate any evidence that the issue of trust and credit sharing have been considered as a factor for the lack of inter-project collaboration.

The above two examples illustrate collaborative learning. Compared to a conventional learning situation, the student receives a design assignment in the form of an ill-defined problem (Cross, 1989). He or she will be guided to solve this problem using a basic, systematic design process (Ulrich and Eppinger, 1995), (Roozenburg and Eekels, 1995). The final outcome of the assignment is usually a materialized design proposal, visualized through a mock-up, prototype or animated Computer-Aided Design (CAD) models (Liem, 2005). In this case, the master will at the most be rewarded with exemplary material to be used for next semester's teaching.

In a situation of collaborative learning, students will be challenged on a design practice and personal development. In addition to being supervised to solve a design problem in the form of a materialized outcome, he or she will also be guided to manage the design process, as well as experiments with new methodologies. The results of collaborative learning may lead to the formation of new methodologies and ways of teaching design within and beyond the university-educational framework. Findings in terms of design knowledge, skills and education are publishable and advances a certain form of strategic design thinking. It will also facilitate long-term collaboration among industrial and educational mentors as well as (future) design graduates. Such collaboration will be highly valuable for industries operating in a knowledge-based economy.

6. Discussion

In today's globalised world, international economic advantage becomes increasingly linked to knowledge-based sectors, tertiary education that generates much of this knowledge is being rapidly 're-conceptualised in tradable terms' (Rudner, 1997).

Therefore, it is important that education enables students and educators to successfully face and cope with rapid and sudden changes, threats and opportunities of the contemporary world. This implies that the education system itself has to be modified. Rapid changes and globalisation require life-long and extended learning, preferably structured in courses at universities and research institutions several times in a person's lifetime (Slaus et al., 2004).

Besides maintenance learning, which is the acquisition of fixed outlooks, methods and rules for dealing with known and recurring situations, require anticipation and participation (Botkin et al., 1979). This means that all parties, which are connected to a specific field of study, need to collaboratively learn and advance the field through a joint acquisition of new knowledge. To achieve a very high expertise in a specific discipline, students also need to interact with those who are advancing the boundaries of knowledge.

The model, which is proposed in figures 2 and 4, provides a basis for collaborative learning and scholarship. Criteria which are essential for its functioning are:

- A common scholarly interest to further the field of study beyond traditional learning.
- A vision and strategy for knowledge building through large long-term research projects.
- A well-defined overall plan on how to organize and segment the large research, design and development projects into smaller ones with intermediate milestones.
- A master-apprentice relationship throughout all levels of the hierarchy
- Clearly defined roles and tasks among the members within a hierarchical teaching / research unit, aligned to the classification and sub-classification of the overarching project. □

REFERENCES

Alvarado, K., Keatings, M. and Dorsay, J.P. (2003). Cultivating APN's for the future: a hospital based advanced practice nursing internship program. *Canadian Journal of Nursing Leadership* 16, (1), pp. 91–98.

Andre, R. and Frost, P.J. (1997). *Researchers Hooked on Teaching: Noted Scholars Discuss the Synergies of Teaching and Research*, Thousand Oaks, Sage.

Becher, T. (1989). *Academic Tribes and Territories: Intellectual Enquiry and the Culture of Disciplines.* , Society for Research into Higher Education, Milton Keynes.

Bhagia, J. and J.A. Tinsley, J.A. (2000). The mentoring partnership, *Mayo Clinic Proceedings* 75, pp. 535–537.

Botkin, J.W., Elmandjra, M. and Malitza, M. (1979). *No Limits to Learning*. Pergamon Press, Oxford.

Boyer, E. (1990). *Scholarship Reconsidered: Priorities of the Professorate*. Princeton, New Jersey. The Carnegie Foundation for the Advancement of Teaching.

Brain, M. (1998) *Emphasis on Teaching :-What is Good Teaching?* http://www.bygpub.com. BYG Publishing, Inc, Raleigh, USA

Carlisle, C. and Ibbotson, T. (2005). Introducing problem-based learning into research methods teaching: Student and facilitator evaluation. *Nurse Education Today*, Volume 25, Issue 7, pp. 527-541.

Cross, N. (19890. *Engineering Design Methods, Strategies for Product Design*. John Wiley and Sons Ltd, London, UK.

Darling, L.A.W. (1984). What do nurses want in a mentor? *The Journal of Nursing Administration*. pp. 42–44

Freestone, R.., Bagnara, A., Scoufis, M. and Pratt, C. (2003). *The Learning Community: First Explorations of the Research-Teaching Nexus at UNSW*, Sydney, University of New South Wales.

Gerdy, K.B. (1998-1999). *If Socrates Only Knew: Expanding Law Class Discourse*. J Reuben Clark Law School, Brigham Young University. Lawyering Skills Section 9. http://www.law.byu.edu/Lawyering_Skills/Section_9

Goran, S.F. (2001). Mentorship as a teaching strategy, *Critical Care Nursing Clinics of North America* 13, (1), pp. 119–129.

Gray, M.A. and Smith, L.N. (2000). The qualities of an effective mentor from the student nurse's perspective: findings from a longitudinal qualitative study. *Journal of Advanced Nursing* 32, (6), pp. 1542–1549.

Higgins, M.C. and Kram, K.E. (2001). Reconceptualizing mentoring at work: A developmental network perspective. *Academy of Management Review*, 26, pp. 264–288.

Hutchings, P. and Shulman, L.S. (1999). The scholarship of Teaching: New Elaborations, New Developments. *Change*. Vol.31, No5, pp 10-15.

Kearney, M.L. (2000). Globalisation: Higher education for social inclusion. *Society for Research into Higher Education News* 14.

Laurillard, D. (2000). Students and the curriculum. In: Scott, P., (ed.). *Higher Education Re-formed*, Falmer Press, London, pp. 133–153.

Lave, J. & E. Wenger (1991) *Situated Learning. Legitimate Peripheral Participation*. Cambridge: Cambridge University Press

Lewis, D. (1996). *DCDPBL Faculty Development Institute Forum*, SDSU. http://edweb.sdsu.edu/clrit/home.html

Liem A. (2004). Managing the Industrial Design Process – A Guide for Studio Practice. Prentice Hall, Singapore / United Kingdom.

Maslow, A. (1954). *Motivation and Personality*, Harper and Row, New York

Nielsen, K. & S. Kvale (1997) Current issues of apprenticeship. *Journal of Nordic Educational Research* 17 (3), 130-139

Ntshoe, M. (2004). Higher education and training policy and practice in South Africa: impacts of global privatisation, quasi-marketisation and new managerialism. *International Journal of Educational Development*, Volume 24, Issue 2 , pp. 137-154.

Pan, D. (2001). *Learning to Teach, Teaching to Learn: A handbook for NUS Teachers*. Centre for Development of Teaching and Learning (CDTL), Continental Press Pte Ltd, Singapore.

Peters, R. S. (1973) *Authority, Responsibility, and Education*. Revised edition. London: George Allen & Unwin Ltd

Reithlingshoefer, S. J. (1992). The future of Nontraditional/Interdisciplinary Programs: Margin or mainstream? *Selected Papers from the Tenth Annual Conference on Nontraditional and Interdisciplinary Programs, Virginia Beach, VA*, 1-763.

Rhem, J. (1998). Problem-Based Learning: An Introduction. *The National Teaching & Learning Forum*. Vol. 8 No. 1.

Robertson, D., (2000). Students as consumers: the individualisation of competitive advantage. In: Scott, P., (ed.). *Higher Education Re-formed*, Falmer Press, London, pp. 78–94

Roozenburg, N.F.M and Eekels, J. (1995). *Product Design: Fundamentals and Methods*, John Wiley and Sons, UK.

Rudner, M. (1997). International trade in higher education services in the Asia–Pacific region: the ASEAN experience and the role of APEC. *World Competition*. pp.1.

Sachdeva, A.K. (1996). Preceptorship, mentorship and the adult learner in medical and health sciences education. *Journal of Cancer education* 11, pp. 131–136.

Schmidt, H. G., Henny, P. A., and De Vries, M. (1992). Comparing problem-based with conventional education: A review of the University of Limburg medical school experiment. *Annals of Community-Oriented Education*, 5, pp.193-198.

Scott, P. (2000). A tale of three revolution? Science, society and the university. In: Scott, P., (ed.). *Higher Education Re-formed*, Falmer Press, London, pp. 190–206.

laus, I., laus-Kokotovi , A., and Morovi , J. (2004). Education in countries in transition facing globalization—a case study Croatia, *International Journal of Educational Development*. Volume 24, Issue 5, pp.479-494

The American Heritage Dictionary of the English Language: Fourth Edition. 2000.

Ulrich, K.T. and Eppinger, S. D. (1995). *Product Design and Development*. McGraw–Hill, New York.

Waks, L.J. (2001). Donald Schon's Philosophy of Design and Design Education. *International Journal of Technology and Design Education*, 11, 37-51, 2001, Kluwer Academic Publishers, The Netherlands.

Wiersema, N. (2000). How does Collaborative Learning actually work in a classroom and how do students react to it? *A Brief Reflection*, Mexico City,

Wood, B.P., and May, W. (2006). Academic Recognition of Educational Scholarship, *Academic Radiology*, Volume 13, Issue 2 , February 2006, Pages 254-257

Zubrick, A., Reid, I., and Paul Rossiter, P. (2001). *Strengthening the Nexus between Teaching and Research*. Department of Education, Training and Youth Affairs, Canberra. p.8. – with reference to Angela Brew's observations.

Websites:

http://www.architecture.com/TheRIBA/WhatTheRIBADoes/PublicAffairs/ContactDetails.aspx

http://knmg.artsennet.nl/themes/24