
Future Regional University/Industry Co-operation: Academic Excellence Through Three-Dimensional Integration

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A new interest in the existence and operation of the many small and medium size enterprises (SMEs) as active partners for the newborn regional universities in Norway has recently been registered. This interest has been expressed by the political parties, the employees and employers' organisations, and from the universities and colleges themselves. This paper will point out and discuss some of the SME's expectations and relate these to the powers of the newborn Högskolen i Telemark's College of Engineering (HiT-TF). The SME's expectations are, in short, that graduating engineers have a practical and broadbased background and, in addition, that these engineers should recognise the need for human and organisational matters as equally important as technical literacy. Finally, the SMEs expect the Engineering College to reflect their real-life operating problems when choosing their curricula, working methods, and forms for contact/co-operation with local enterprises. Provided that the definition of *academic excellence* is expanded to cover co-operation along three axes, the auspices for a future close co-operation between HiT-TF and local industry, including the SMEs, look promising.

INTRODUCTION

Stimulated by a public programme for creating better links between the newly organised regional universities and local industry, a 1996 Telemark survey investigated the level of contact between small and medium size companies (SMEs) and the Engineering College of Högskolen i Telemark (HiT-TF).

The leaders of 20 SMEs were interviewed about their future plans, limitations, possibilities, workforce qualifications, past and present contact with the Engineering College, and possible future co-operation. It was indicated that all SMEs had positive expectations for the future, even if their location appeared distant with respect to their present and expected markets. Many were planning heavy investments and were looking forward to close co-operation with HiT-TF. However, it appeared that their contacts with HiT-TF had so far been minuscule in spite of their many positive attitudes and expectations about linking themselves to the local university. As a rule, the SMEs do not have resources to do their own research.

Simultaneously, HiT-TF has been working out its *mission statement*. Even if this ambitious document may be said to reflect some goals of the already established universities, some signals about a future serving a society mostly containing SMEs are also given.

THE SME SURVEY

Sampling

A Norwegian SME is defined to have between 10 and 100 employees. However, as no rules are absolute, even enterprises as small as one (plus one apprentice) and as large as 130 are included in this survey to reflect more precisely the structure of the Telemark industry. The numbers and size of SMEs surveyed are:

- 5 with 1-5 employees
- 8 with 11-50 employees
- 3 with 51-100 employees
- 4 with more than 100 employees

The smallest companies were making timber derived products, like windows, stairs, doors, etc, mostly for private homes. The largest companies were in induction heating (130 employees) and production of furnace bricks (125 employees). In addition to these categories, such branches as dairy, shipbuilding, mechanical workshops, building constructors, electrical engineering consultants, and the process industry, were also represented.

Viewpoints

As expected, a variety of viewpoints, including satisfaction with the technical level and the adaptability of Telemark's Engineering College (HiT-TF) graduates and emphasis on the importance of non-engineering subjects (economics and practical organisational work etc), were mentioned. More specifically, the following items were stressed by a significant proportion of the SMEs:

- We do not know the HiT-TF (80 %), therefore:
 - HiT-TF should make a presentation/catalogue to introduce itself (70 %).
- Students should hold a trade certificate before entering the HiT-TF (80 %).
- We are not unwilling to pay HiT-TF for a useful Main Project Report (85 %).

These signals were in part quite surprising as there was reason to believe that the *Telemark Model*, which includes about 30% of total time dedicated to project work, should have given the HiT-TF a very broad field of contact with local enterprises. Further, it was evident, but not unexpected, that the SMEs would favour engineers with a strong practical background. However, it *was* surprising to learn that so many of the small and medium size enterprises were willing to discuss payment for the Main Project of the final 6th Semester, maybe opening the possibility of earning revenue on ordinary educational activities.

Need for co-operation with HiT-TF

Only the two largest companies reported co-operation with the Engineering College. The situations for the rest of the SMEs were:

- 40% labelled such co-operation *useful, interesting, open for it*;
- 40% said *wanted*; and
- 15% expressed such contact as *needed* or *urgently needed*.

Only one SME, employing five persons, was not interested. On the other hand, this factory did not report co-operation with any one else either.

Research and development work

Except for one enterprise (signalling contact as *urgently needed*), all SMEs were undertaking R&D work. This ranged from challenging contacts with customers, suppliers and colleagues to traditional research. Again, only the two largest firms had resources to place themselves in the high end, and both of them co-operated with HiT-TF in their research programmes.

Possible fields of co-operation between SMEs and HiT-TF

The most frequently mentioned fields of interests were:

- Logistics
- Everyday judgements and estimations
- Energy conservation
- Testing and documentation
- Continuous education programmes

These items seem to have the *daily-life* aspect and practical level of engineering in common. The limiting factors given for not handling such problems themselves were either lack of time or money.

ON TO THREE-DIMENSIONAL THINKING

Working in one dimension

Until 1982, when the co-operative learning programme known as the Telemark Model was institutionalised, the present-day HiT-TF can be said to have been one-dimensional with respect to extramural contacts [1]. The learning process usually took place within the classroom for 30 hours or more a week. A teacher's scheduled load was 24 hours a week. In addition, a teacher's duties included evaluation work, presence in the laboratories (4-8 hours a week), the production of texts and the arrangement of excursions. The students, at that time called *pupils*, were supposed to learn a curriculum designed by governmental committees.

Thus, in this context, the one-dimensional engineering education programme may be described as the *centrally governed and teacher-centred system, mostly taking place inside the classroom*.

Adding the second dimension

By introducing 25-30% of total student time for project work in groups, the Telemark Model opened up the second dimension: practical co-operation with private and public enterprises. At about the same time, a teacher's load went down to 16 hours a week, and the title was changed to *college lecturer*. Simultaneously, *student* replaced the *pupil* notation for the *receiver of learning*.

The second dimension, then, is represented by *the school's outreach to local enterprises*, offering its services and receiving its inputs even from other channels than the official committees mentioned above. The student becomes the hub of the system, acting as the receiver of learning as well as a problem-solving resource. The role of the teacher is expanded to include the aspect of leader of learning processes.

The wakening third-dimension

In October 1997, a governmentally appointed Committee proposed that Norway should consider the launching of a *Law on Continuous Learning* [2]. In a convincing way, this Committee tends to confirm the findings among the twenty Telemark SMEs referred to in this paper; according to the Committee, continuous learning, mostly at the lower and intermediate level, appears to be an important factor in the struggle for keeping Norway competitive in a global market situation.

The Committee does not seem to distinguish clearly between future challenges for higher and secondary learning institutions. It may be assumed then, that the third dimension could mean that universities and colleges are expected to include *even institutions working at lower academic levels* in their co-operative programmes.

DISCUSSION

It can be said that the main role of higher education is to strive for the development and conveyance of new insight. It may also be suggested that this work has taken place on universities and colleges' own premises at a fairly well specified academic level with respect to content and form. The proposal launched by the Norwegian Committee is just one among other signals asking that universities and colleges rethink their

mission and include other activities than traditional research in the definition of academic quality [3][4].

However, these institutions are not thereby asked to renounce their academic excellence. They will still be expected to work at the cutting edge of any thinkable professional activity. But a rewarding system built around research only may be the source for future problems, or even failure with respect to the SME's expectations.

The recipe must then be to accept and reward excellence also in broadbased teaching activities, public service, and organisational activities as well as research. Working in the three dimensions sketched above will probably not be possible without mutual acceptance and respect within the framework of quality set by the inherited standards for scientific methodology so well developed and preserved by the academic world.

REFERENCES

1. <http://www-pors.hit.no/~trondc/wcee.htm>
2. <http://odin.dep.no/kuf/publ/97/buer/>
3. <http://www-pors.hit.no/~trondc/future.htm>
4. <http://www-pors.hit.no/~trondc/change.htm>

BIOGRAPHY



Trond Clausen has been an Associate Professor of Telemark College since 1989, his association with the institution stretching back to 1973. From 1978-89 he was Rector of the Telemark College of Engineering Technology. He is Vice-President of the Norwegian Society for Electrical Engineers (NEF), Past President of the National Association of Engineering Technology Rectors, and a member of a number of professional societies, including IEEE (EdSoc), SEFI and the UICEE. Trond pursues research and development work in course development and documentation, program development and documentation, school/industry development and documentation and developing international co-operation and documentation.

Proceedings of the 1st Asia-Pacific Forum on Engineering and Technology Education

edited by Zenon J. Pudlowski

The *1st Asia Pacific Forum on Engineering and Technology Education*, held at Monash University, Clayton, Melbourne, Australia between 6 and 9 July 1997, heralded a promising new phase in the development and delivery of engineering and technology education in the Asia-Pacific region. Close to 100 participants from 23 countries from Asia, Europe, Africa and the Americas attended the Forum. Over 80 paper presentations were made, 78 of which are included in this volume of Proceedings.

As an activity of the recently established Asia-Pacific Higher Education Network, Engineering Education subnetwork (APHEN-EE), a primary purpose of the Forum was to bring together academics and individuals concerned with engineering and technology education in the region for discussion and the exchange of information, and the formulation of an action-oriented agenda for the network. The papers included in the Proceedings superbly indicate the fertility and dynamism of prevailing discourse from which the way forward will be determined.

Papers were presented in one of six so-called Asia-Pacific Forum sessions covering the diverse and significant issues of *International Collaboration, New Methods in Engineering Education, Information Transfer and Multimedia, Learning Styles in Engineering Education, Industry/Academia Collaboration* and *Issues Concerning the APHEN-EE*. The proceedings should prove to be a valuable resource for some time to come for those involved with engineering and technology education.

To purchase a copy of the Proceedings, a cheque for \$A100 (+ \$A10 for postage within Australia, and \$A20 for overseas postage) should be made payable to Monash University - UICEE, and sent to: Administrative Officer, UICEE, Faculty of Engineering, Monash University, Clayton, Victoria 3168, Australia. Tel: +61 3 990-54977 Fax: +61 3 990-51547