Trained for Growth? The state of training and education in German speaking countries

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Introduction

In the context of the German initiative DSTTP, a survey was carried out in German speaking countries among experts to get an overview about the demand of highly qualified staff in solar heating and about the education capacities of universities. In order to receive quantitative information, electronic questionnaires were sent to experts from manufacturers, research institutes and crafts enterprises. Some manufacturers and institutes were also directly contacted via telephone.
The surveys were carried out in August/September 2008. Finally 24 of 250 invited manufacturers participated, 6 of 6 invited research institutes and 37 crafts enterprises. Furthermore, 29 of 36 asked professors delivered information regarding their education capacities in solar heating.

Qualification profile of employees in the solar heating sector

Following the answers, more than 80% of the companies expect problems due to a lack of qualified staff within the next three years, and not even today the labour market can fulfil their demand.
Fig. 1 shows the qualification of employees at manufacturers. More than 50% of the current employees hold an academic degree. There is obviously a significant demand especially for Bachelors and craftsmen. About half of the companies would hire additional qualified staff if they were available. It has not been asked whether and to what extend the lack of qualified staff hinders the growth of the companies, but it can be assumed that there is a negative influence already now.
A similar picture delivered the investigation at research institutes. Here, even more than 20% of the current number of highly qualified employees could be employed immediately, if they were available. It can be assumed that several R&D-projects could not be carried out in the way planned or some even not at all. More public support for research is helpful, but additionally highly educated specialists are mandatory to carry out the work. To which extend this hinders the technical development at manufacturers can only be speculated on.

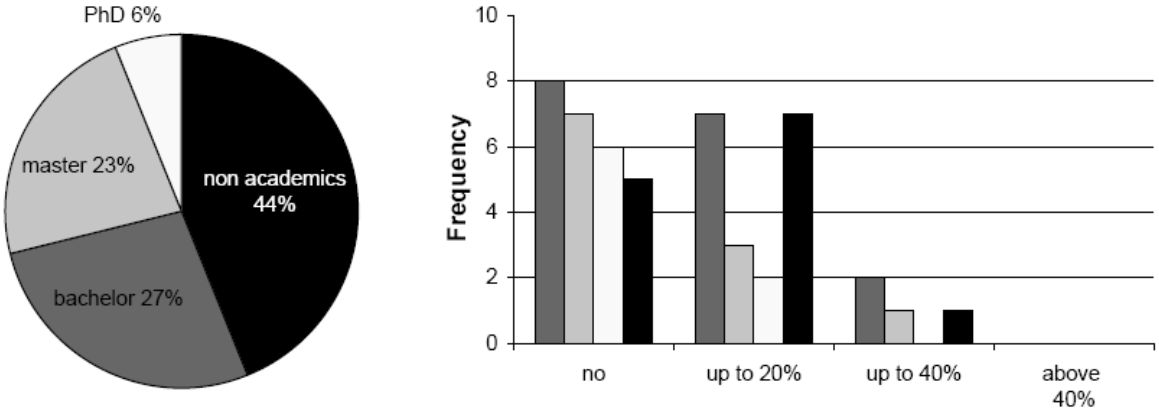

Fig. 1: Manufacturer: Current qualification of employees (left) and demand of additional employees on different qualification levels (right).

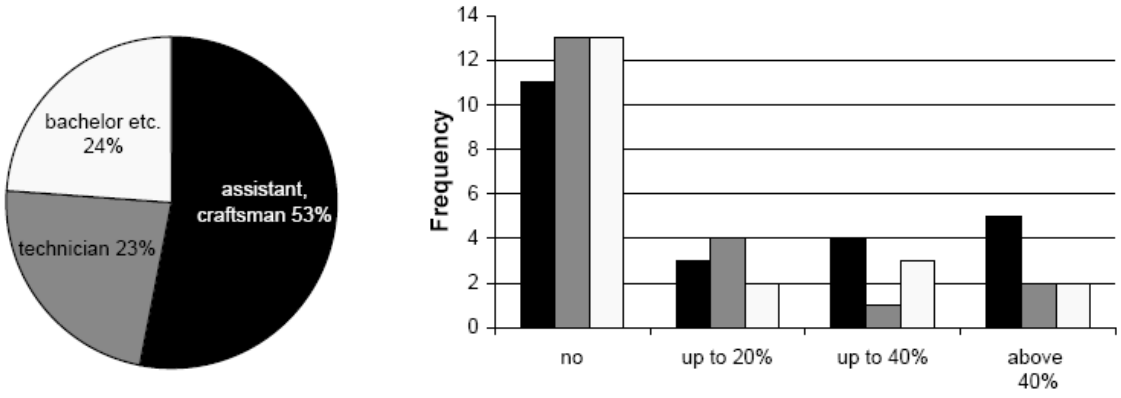

Fig. 2: Crafts enterprises: Current qualification of employees (left) and demand of additional employees on different qualification levels (right).

Fig. 2 shows the qualification of employees at crafts enterprises. Surprisingly, nearly a quarter of the current employees hold an academic degree. This result is perhaps not entirely representative for the sector, because probably mainly big crafts enterprises with plenty of employees sent back the questionnaire. Anyway, the result gives an indication that the demand regarding the qualification of the employees has increased significantly in the last 20 years. Also these crafts enterprises would obviously employ about 20% additional staff, if they were available. It turned out that the job market in solar heating lacks especially installers and planners.

Desired qualifications

The survey showed that practical experience is important for the companies if they seek for additional staff. Most of the companies claimed that the necessary knowledge has obviously not been taught during the previous education at apprenticeships or at universities, but by internal continuing education or by "learning by doing" in the companies itself. The companies do not really appreciate the level of education at universities. They miss especially soft skills and those in simulation techniques. And the level of practical education for assistants is estimated to be even worse …

The continuing education offered is not regarded to be sufficient for more than half of the manufacturer, crafts enterprises and institutes. About 65% of the crafts enterprises judge the continuing education of associations or independent educational institutions as insufficient, but 80% praise further training offered by manufacturers. The demand for continuing education, especially on advanced level, is obviously very high.
Under the current conditions, the ideal candidate has undergone a practical training, holds a university degree (depending on the tasks) and, furthermore, has passed continuing education.
It can be concluded, that in total about 20% of the current staff could be employed additionally, simply due to a lack of qualified job applicants on the labour market. Manufacturer are mainly looking for applicants on Bachelor level and research institutes mainly on Master level, although the necessary knowledge is not regarded to be taught sufficiently at universities so far. In general, the education of craftsmen and the education at universities is regarded to lack in quality and quantity.

Education at universities

36 professors from Germany, Austria and Switzerland were asked to report about courses offered and number of successful students in solar heating at their respective universities. 29 professors answered, thus, the results are probably representative at least at the moment of the investigation in September 2008. In Fig 3, the described problems on the demand side become explainable. Obviously, plenty of students receive an academic basic education in solar heating, but in most of the cases it remains superficial, e.g. as part of a course in energy technology. A more comprehensive education takes only place if special programmes are offered, e.g. for renewable energies, and if specialized professors for solar heating are available. This is the case for Universities of Applied Sciences (Fachhochschulen) in Jülich, Berlin, Rapperswil and Nordhausen, for universities at Kassel, Oldenburg (mainly students from developing countries), Stuttgart and Graz.
Furthermore it came out that about 150 theses yearly deal mainly with the subject of solar heating and cooling. It might be mentioned that the professors did not have incentives to understate the number of their graduates.

Recommendations for non academic qualification

1. **Extension and improvement of the teaching of solar heating in technical colleges**
   Plenty of the companies desire employees with practical training, taught during an apprenticeship, especially at crafts enterprises. But, the apprenticeship is not seen as a main source of knowledge for solar heating so far.
2. **Inspire and educate more young people as specialists in solar heating**
   The companies anticipate a lack of qualified staff, and there is a high demand already now. This is the case for installers in crafts enterprises, and in all operational areas for manufacturers.
3. **Extension and improvement of further training**
   The offer of further training, especially for already pre-educated employees, should be extended. The existing offers are regarded as not sufficient and of poor standard, with the exception of the training executed by the manufacturers.

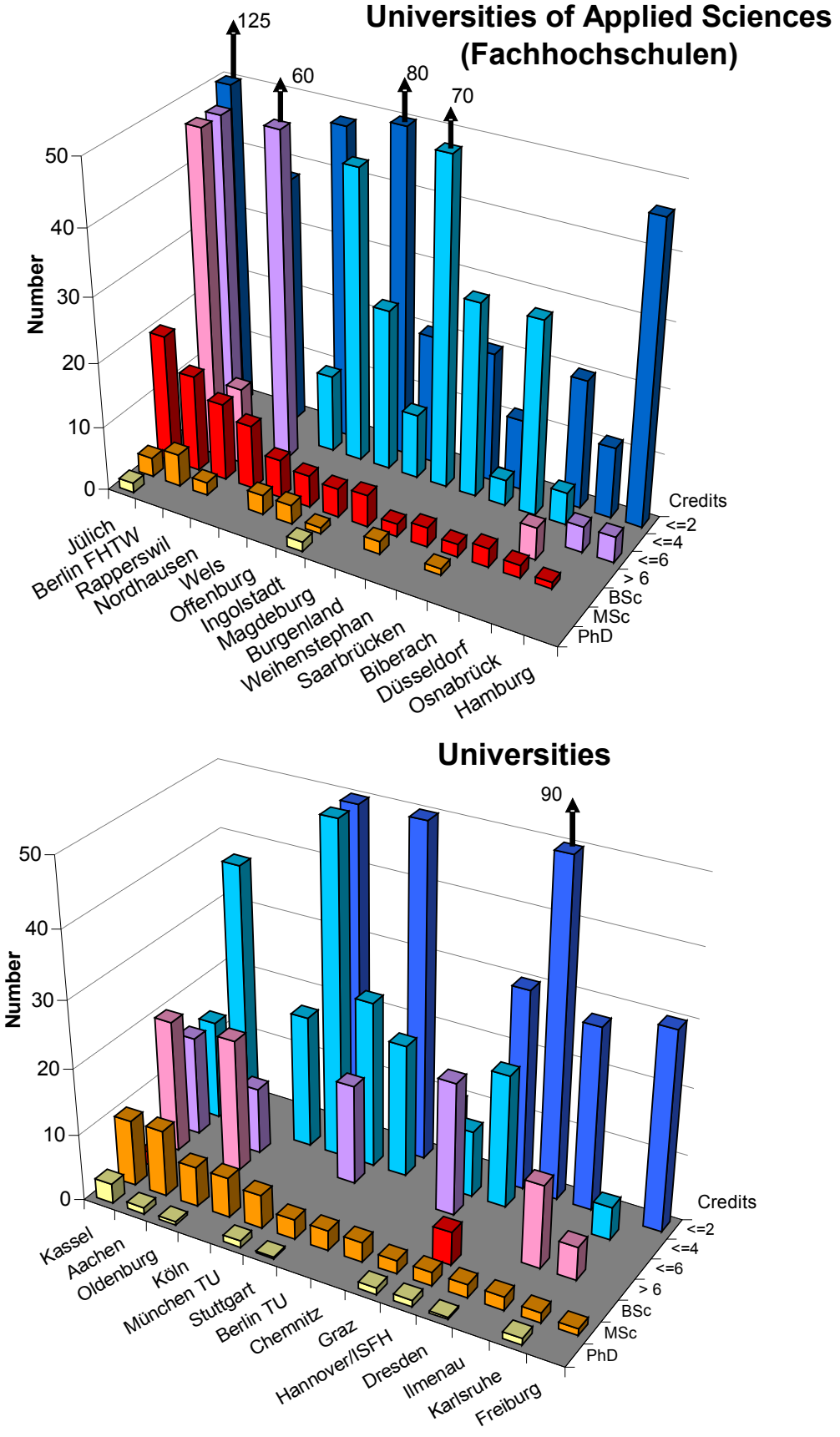

Fig. 3: Number of students who passed a certain level of education in solar heating. 2 Credits correspond to about 20 classroom hours.

4. **Introduction of Coaching as new way of in-house-training**
   Coaching might be able to support the "training on the job" by additional theoretical background. It might be a solution especially for those employees, who can not take advantage any more from the first three recommendations.

In all these steps, the manufacturers should be involved. They have already experience with qualification, and the crafts enterprises judge their courses as very valuable. The manufacturer might benefit from more professional installations, therefore more satisfied customers, and finally additional orders.

Recommendations for university education

1. **Increasing the number of professors for solar heating**
   The number of professors for solar heating is too small to educate the demanded number of highly qualified graduates. The natural alternation in generations at the universities is too slow to increase this number sufficiently rapid. Furthermore, in most cases the more conservative, older generation of professors decides about the area of research and teaching of tenders for new colleagues. Therefore, incentives have to be developed to stimulate universities to adjust new professorships for solar heating and cooling. A well established measure is foundation professorships, which might be paid for a certain period by industry, by industrial unions or by the respective government.
2. **Increasing the number of graduates with special knowledge in solar heating**
   Due to the strong interest of the students, the number of programmes in renewable energies develops quite dynamic, despite the lack of professors. Even specialists have problems to keep the view over different profiles of programmes, as more this is the case for (potential) students and companies seeking for specialized graduates. Here, an automatically updated data base might be helpful, as is has been suggested by the council "universities" of the German Society of Solar Energy (DGS) already for a long time. ISES has offered to host such a data base. The initial costs would be in the range of 50 k€, operational costs would not arise. This amount might be covered by all industrial unions on renewable energies in Europe and/or by government(s).
3. **Increasing the qualification of graduates**
   The qualification of graduates seems so far to be more or less directly correlated with the number of specialized professors, but a quality assurance might be reasonable as well. One approach could be the collection of peer-reviewed teaching material on solar heating.
   Another important issue is the extension of the successful PhD-network SolNet. So far, biannual courses in solar heating and cooling are offered for about 30 PhD-students mainly from Europe, but also from all over the world. Unfortunately, the financing of the EU ends 2010. An extension with yearly courses would deliver perfectly educated and internationally cross-linked experts in solar heating. The costs of about 20 k€/a might be covered by industrial unions like ESTIF, perhaps supported by government(s).

Summary

About 80% of all companies contacted and research institutes in German speaking countries expect a lack of sufficiently qualified staff during the next three years. These companies would hire additionally nearly 20% of their current staff, if they were available to find them on the job market. Practical education during apprenticeships and, to a minor extend, theoretical education at universities are not regarded to be sufficient so far by

companies. Courses for continuing education are widely demanded, especially on advanced level. Only the courses offered by manufacturers are widely acknowledged. Comprehensive training takes only place at universities with special programmes for renewable energies and/or professors specialized on solar heating.

Conclusions

The job market in solar heating is not trained for growth. Contrary, it can be expected that the lack of highly qualified staff might become a bottleneck of the optimistic growth perspectives as they have been outlined by ESTTP. Concrete actions are required also from ESTIF to support the members of the industry union. Beside the exchange of experience and best practice, the direct support of high level PhD-education on a European scale seems to be as timely as necessary.

References

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