

# Relevance of Academic Internship to the Quality in Construction Management Education\*

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Aalborg University, Denmark, has for a decade run an M.Sc. course in Construction Management in the Building Industry in compliance with the university's general mode of study: Problem Based Learning, project organisation and group work. Recently the programme was reviewed based on questionnaires completed by graduates and their superiors, and guided interviews. The review included the third semester's optional internship. The internship is designed to combine practical and academic learning within the semester theme: Innovation. A comprehensive report documents the learning. This paper describes the findings and recommendations of the review for this internship. The overall conclusion is that the internship creates added value for the students, and thus either optional or compulsory internships should be incorporated in future programmes. The industry advances a positive stance towards internships. Some of the weaknesses of internships are pointed out, e.g. the preparedness of the companies and the academic level of the students' internship report.

**Keywords:** construction management education; problem based learning; internship; project orientation; co-operation

## 1. Introduction

When the quality of an M.Sc. programme is discussed, one of the indicators often referred to is its external effectiveness: How well does the programme prepare a student for the occupation concerned; and does it in fact lead to this occupation? It is commonly assumed that external effectiveness is better in those modes of education that, at least in part, are based on the world of work itself, and several sources highlight the necessity of strong links between engineering education and industry [1–4]. Internships provide this linkage and have long been valued in academia for providing students with practical experience in a guided setting. Internship experiences in the field of construction management are no exception. Divine *et al.* [5] describes internships as a win–win–win situation, referring to the students, the industry, and the educational institution.

Aalborg University has from its inauguration in 1974 emphasised the external effectiveness of its educational programmes and highlighted its co-operation with the industry in its environment with regard to research as well as educational programmes. The external effectiveness is thus in focus and has become even more important because of the newly introduced accreditation of its programmes.

The purpose of this paper is to describe the nature and features of an 'academic internship' as part of the Aalborg University M.Sc. programme in Construction Management. The notion 'academic internship' is used here because the semester has

objectives and aims related to academic as well as practice-oriented learning. These internships, which are an optional alternative in semester 3, all take place within private companies in the industry, and the views of the candidates as well as their superiors on this educational element have been shown as part of a broad review of the programme.

## 2. Description of the M.Sc. programme in Construction Management

For many years the building industry has been considered an industry that exhibits a series of problems, e.g. [6], among others, poor quality of the end-product, several errors and inexpediencies during the construction process, low productivity and low EBIT (earnings before interest and tax).

A large range of government sponsored projects and programmes that aim to improve this situation have been implemented and subsequently institutions of higher learning have increased their focus on the problems in the industry. These include the civil and structural engineering programmes and their elements of construction management. During the 1990s there was increasing interest among undergraduate students to continue their studies after graduation with a specialisation in construction management. In 1999 the two years full time Masters' programme: 'M.Sc. in Engineering in Construction Management' was started at Aalborg University. The programme design was in part inspired by Aalborg University's Industrial Management Programme, which admits students with a Bachelor's degree in Mechanical Engineering and

prepares them for management positions in the manufacturing industry.

The Construction Management programme has a threefold focus: a project focus, a company focus, and an industry focus. Its four semesters have the following themes:

- *First semester:* Production and Project Management in the Building Industry. Focus is on a single order or project and relates to the management of the order/project, taking into consideration the views of all or a considerable number of the stakeholders involved.
- *Second semester:* Corporate Management in the Building Industry. Here the focus is on management in a company that is involved in several projects or orders that run concurrently, and as such compete for the same scarce resources in the company.
- *Third semester:* Innovation in the Building Industry. This semester aims to prepare the students to participate in an innovative development of a company, in a cluster of companies or in the Industry as a whole.
- *Fourth semester:* This semester is dedicated to a final thesis within one or more of the subjects included in the three preceding semesters.

2.1 The programme framework

The formal framework for the programme consists of a syllabus prepared by the Study Board within the limitations given by the Danish government and the

university Academic Board. The fine-tuning of the programme is carried out by the Study Board in close co-operation with the instructors who continually receive information from students, candidates and companies about the strengths and weaknesses in the programme. Major changes will have to be approved by bodies higher in the university hierarchy. However, until now, the programme has been subject to few major changes. Figure 1 gives an overview of the framework and the main elements.

The mode of learning is Problem Based Learning, which exists in various forms, but here it implies three basic principles for the learning: it is problem based, the student is in the driver's seat, and it is based on group work [7–10]. The students spend more than half of the time on project work guided by the semester themes and by descriptions of what should be achieved in the semesters. The remaining time is course work.

The semester projects are the key elements in the programme. They are usually prepared in co-operation with companies in the building industry, for example a window manufacturer in semester 1, a contractor company in semester 2, a project developer in semester 3, and a consultant engineer in semester 4. In semesters 3 and 4 the students often co-operate with several companies. The course of a project has the following stages, however, some stages may run in parallel and there may be loops in the process: (a) Introductory problem identification based on negative effects observed. (b) Problem

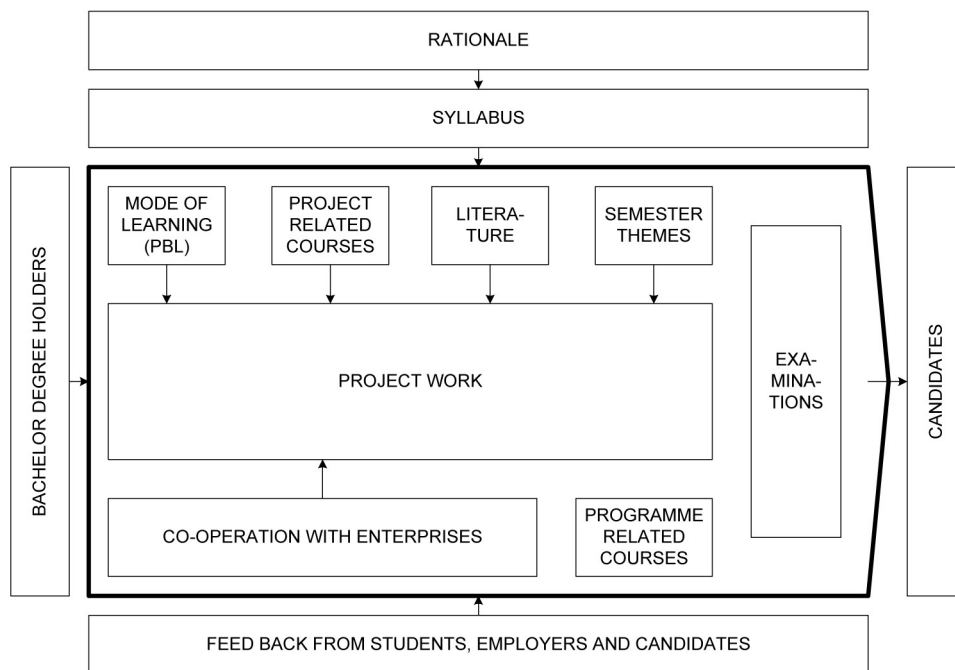


Fig. 1. The M.Sc. (Eng.) programme in Management in the Building Industry. Overall framework and main elements.

analysis and formulation of the key problem(s). (c) Preparation of solution options and selection of the solution based on criteria established by the students. (d) Planning of the implementation of the selected solution. (e) Assessment of the consequences of the solution.

All projects include the stages above. However, some projects may focus on problem analysis, others on solution preparation and implementation.

### 2.2 *Third semester: An optional internship semester with two-fold objectives*

The syllabus allows a number of alternative study modes for the programme's third semester. The overall objectives of the third semester are that the students should achieve thorough knowledge of technological, financial, social and organisational systems and processes in a company or in a network of companies. Furthermore, they should attain knowledge about the development of systems that can further innovative development in companies in the building industry, in networks of companies or in the national sector.

There are several aims of the semester. The students should be able to demonstrate an improvement in their understanding of long term planning and development, including new modes of co-operation between a company in the building industry and the other parties in building projects. Furthermore, they should attain an improvement in the understanding of the integration between a company's technical, financial and organisational systems, including the coherence between a company's product areas, markets, production, organisation and management. Finally, the students should attain knowledge regarding the preparation of plans for development of networks of companies, for a company as a whole, or for parts of a company.

The most popular form has a strong company focus and comprises an internship semester. If a student chooses this option, the objectives and aims of the semester are extended. The additional objective is that the student should gain an insight into the transfer of theories into practice and into how theories can make the practical work more relevant and rational. The additional aims are that the student should gain an insight into how the internship project and company operate regarding the daily running of a project in the building industry, management of time, costs and income, quality, work safety and environmental issues. Finally, students should gain an insight into general management and organisational issues in projects and modes of co-operation in projects.

Enrolled students can, at the beginning of the semester, choose between various ways to conduct

the 30 ECTS semester. Internship is one option, problem based group work and course activities are other options. The students' choices are based on a complex social group process, and the number of students selecting internships varies yearly. When the internship mode is selected, the student identifies and approaches a company in order to obtain an agreement stipulating the outline of the internship. The student is employed by the company and usually receives a salary of about 40 % of the salary of a graduate. The salary seems important as it means that the student is not 'attached to' the company, but 'employed in' the company and, as such, is part of the company and its day-to-day life. Employment is important as this implies that the student is covered by the company's Workmen's Compensation Scheme. The university is not part of the agreement and so plays no part in the internship. However, the study board receives a copy of the employment contract and approves and merits the foreseen contents of the internship (a one-page description including learning goals) and the university supplies a semester supervisor for the student.

During the 4–6 months internship period the student is given management tasks in the company in line with other employees, for example as assistant project manager and, consecutively, the student collects information for the semester project report. The report consists of two parts: A descriptive part about the internship company, and the project(s) on which the student has been working and an academic report within the theme of the semester: Innovation in the Building Industry.

The semester examination is based on the report, the student's presentation of her or his activities during the semester, and a discussion between the student, the supervisor and the examiner. The academic achievements as well as the experiences undergone are assessed as part of the examination in accordance with the semester objectives and aims.

### 3. Research question and methods

The focus of this paper is the academic internship's contribution to the external effectiveness of an educational programme. The above described M.Sc. in Engineering in Construction Management programme is used as a case for this research.

The research question guiding the research is stated as: *How does internship contribute to the external effectiveness of an M.Sc. programme in Construction Management?*

The method selected for approaching this research question is three-fold. Initially, a literature review on the effects of internships is carried out. The procedure for this was to search for academic

journals in online databases such as Academic Search Premier, ABI ProQuest, Science Direct and Web of Science. In total 30 relevant journal papers were selected for in-depth review. After reading the 30 papers, three main focus areas surfaced. These areas were used to structure the literature review. Subsequently the review was conducted, and empirical data were gathered primarily through qualitative studies of a survey but also through structured interviews.

The survey was conducted among 100 students who had graduated from the M.Sc. programme in Construction Management since 2001. Contact information for the students was collected through alumina clubs and business platforms like LinkedIn. The survey was distributed and the data collected electronically. The response rate was 83%. As an add-on to the survey, the graduates were asked to identify their closest superior and hand a designated questionnaire to them. In total 21 superiors replied to the survey. Of the 21 superiors, six were randomly selected for more in-depth telephone interviews. The triangular approach applied increases the validity of the results, and ensures that conclusions drawn from this research are usable internally as well being applied to a wider application area within the domain of engineering.

#### 4. Literature review

Research into internships within the scope of specific engineering education is limited. This literature review is therefore based on a broader review, which includes several other educational domains.

Internships are defined in various ways and called by various names [11]. Generally, an intern is someone working in a temporary position with an emphasis on education rather than employment. In this research internship refers to an academic semester where the student is working in a company, assisting with real tasks.

Previous research on internships has taken various paths. The most prevalent areas are: the purpose of internships e.g. [5, 12–13]; the advantages and disadvantages of internships, e.g. [14–17]; internship stages / process e.g. [18–20]; students' attitudes toward internships e.g. [14, 21]; the supervision and monitoring of students during internships, e.g. [22, 23] and the gains for the university of internships, e.g. [5, 11, 15]. The following elaborates on the literature about the purpose of internships, the advantages and disadvantages of internships and, finally, the gains for the universities.

The purpose of internships is commonly cited as that of promoting the integration of academic and experimental learning [5, 12–13, 24–25]. Students develop an enhanced appreciation of concepts

learned in the classroom and how to apply them in a professional setting [12]. Moreover, through hands-on experience students may gain information that is not covered in the classroom [12, 24, 26]. Several research documents indicate that an internship is an effective learning tool [5, 27–28].

Coco [14] argues that the purpose is to provide a planned transition from the classroom to the job, and internships are a natural bridge between university and the world of work. Students, educational institutions, and businesses believe that internships complement a student's academic work. This is supported by other researchers [5, 17, 29–30]. Some also argue that internships can help students to solidify their career decision before having to enter the workforce [24–25]. In conclusion, of the purpose of internships, Divine et al. [5] state that the primary reason for the popularity of internships is that they offer win-win-win opportunities for students, employers and schools. Coco [14] agrees and calls this the synergy of internships.

Perhaps the most important advantage of internships is the practical work experience itself [5, 14, 17, 31–32]. The real-world experience that students receive from an internship helps them in many ways. Moreover, Ross and Elechi [24] found that almost all interns in their study thought that their experience increased their understanding of the domain. The advantages of internships are in literature primarily connected with additional learning, and the student's transition into the job market and their subsequent career. Additional learning is in the areas of social relationships and interpersonal skills [5, 12, 33], learning to communicate more effectively [11–12, 16–17], improved knowledge of industry [5, 13–14, 34–35], and improved creative thinking [11, 15, 17].

The most stated advantage of internships is that there is evidence that an internship leads to easier and quicker first-job attainment and more job offers [5, 11, 15, 17, 21, 31, 36–37]. As Coco [14, p. 4114] states: 'The right internship can be the key to a great job, because it gives the student a chance to take on real responsibilities while working side-by-side with seasoned professionals'. In other words, internships provide students with stronger resumés. The reason is that students are more prepared because of their hands-on experience, and hence the transition from class room to real life is eased [5, 11, 13–15, 17]. There is also research showing that graduates with an internship on their resumé receive a higher salary [11, 14–15, 17, 31]. Finally, it seems that students with internships have higher job satisfaction [5, 11, 13, 16, 24, 27, 38]. This is clearly connected with the increased preparedness.

Only few disadvantages of internship are mentioned in the literature. Some argue that internships

are not academically rigorous [12], and Fabianic [39] questions whether it is even appropriate to grant academic credit for learning a job. Others argue that students may downplay the academic purpose of the internships [26, 39], and the reason for signing on for internships might be because it is the easy path and / or because it increases the chance of getting a job [5, 12].

Faculty and universities gain through the maintenance of closer contact with the needs of the working world in the local area [11, 15, 26, 36] and thereby they are kept up to date with the latest development in the field. Furthermore, because internships are attractive to students, more will sign on. In addition, there is an increase in the ability to place student after graduation [11, 12, 26]. Having an internship programme can enhance the reputation and visibility of the college and the department as well as providing input for curricular assessment [11, 14]. Ross and Elechi [24, p. 307] state that internships provide 'a litmus test of whether classroom teaching has enough relevance and usefulness to translate into the work place'. Further, business professionals who are involved with student interns may feel a stronger tie to the academic institution and may be potential candidates for advisory boards and research participants [5, 12].

## 5. Results of survey

As a prelude to the results of the qualitative research, it should be mentioned that some educationalists have argued that the academic achievements of internships could be too low, considering that the semester is part of a Master's programme, while others have thought that the students were unable to cope with the two rather different sets of semester aims.

In the following, the views of the superiors are regarded as the views of the companies (employers).

### 5.1 The graduates' assessment of the learning achievements during the semester

Table 1 shows the graduates' assessment of the achievements of the internship semester. Almost all graduates assess that the overall achievements (academic as well as practical learning) to a high or very high degree correspond with the period of a semester. Only two graduates answered: 'To some degree', and none: 'To a lesser degree' or 'not at all'.

The question about insight into practical matters resulted in an almost similar result, but not quite so positive. Some argue that they already had a practical knowledge before the internship, for example some had an education as craftsman, and others

**Table 1.** Respondent answers to internship. *N* is the number of answers in the survey and *n* the number of answers in each subset. Note: only categories with *n* > 0 are shown in the table

Question	<i>n</i>	% ( <i>N</i> =)
To what extent did you obtain an insight into practical matters in the industry?		
To a very high degree	27	45% ( <i>N</i> = 60)
To a high degree	24	40% ( <i>N</i> = 60)
To some degree	7	12% ( <i>N</i> = 60)
To a lesser degree	2	3% ( <i>N</i> = 60)
Did the overall achievements match the time spent?		
To a very high degree	30	50% ( <i>N</i> = 60)
To a high degree	27	45% ( <i>N</i> = 60)
To some degree	3	5% ( <i>N</i> = 60)
The effect of the internship on the graduates' chances to get employment		
To a very high degree	26	47% ( <i>N</i> = 55)
To a high degree	11	20% ( <i>N</i> = 55)
To some degree	15	27% ( <i>N</i> = 55)
To a lesser degree	2	4% ( <i>N</i> = 55)
Not at all	1	2% ( <i>N</i> = 55)
The companies' assessment of the level of importance of an internship period in the programme		
Very important	11	53% ( <i>N</i> = 21)
Important	9	43% ( <i>N</i> = 21)
Somewhat important	1	4% ( <i>N</i> = 21)
Candidates' view on the future status of an academic internship		
Compulsory	31	52% ( <i>N</i> = 60)
Optional	29	48% ( <i>N</i> = 60)
Companies' view on the future status of an academic internship		
Compulsory	16	80% ( <i>N</i> = 20)
Optional	4	20% ( <i>N</i> = 20)
The degree to which the companies knew about the intended contents of an 'internship semester'		
To a very high degree	4	7% ( <i>N</i> = 59)
To a high degree	24	41% ( <i>N</i> = 59)
To some degree	14	24% ( <i>N</i> = 59)
To a lesser degree	9	15% ( <i>N</i> = 59)
Not at all	8	13% ( <i>N</i> = 59)

**Table 2.** Areas of new competences achieved during the academic internship. *N* is the number of answers in the survey and *n* the number of answers in each subset

New competence achieved	<i>n</i>	% ( <i>N</i> = ??)
Knowledge of management of the building process	31	52% ( <i>N</i> = 60)
Insight into difference between theory and practice	15	25% ( <i>N</i> = 60)
Experience in co-operation with people with other backgrounds	14	23% ( <i>N</i> = 60)
Knowledge of technical matters (execution methods, etc.)	5	8% ( <i>N</i> = 60)
Insight into business management	4	7% ( <i>N</i> = 60)

argue that the internship opportunity should have been offered late in the bachelor programme, which had more focus on pure technical subjects like building structures and soil mechanics.

The graduates were also given the opportunity to specify which new competences they had achieved. Table 2 gives the distribution of the 60 answers. It is noticeable that 92% of the new competencies mentioned are within the scope of the semester aims, related to management and co-operation as well as relations between theory and practice. One graduate mentions that the internship has given him a practical competence that the university cannot give.

Thus, it can be concluded that the semester has a reasonable length considering the students' achievements and that the learning is well in line with the programme syllabus. None of the graduates expressed opposition to or criticism of the dual set of aims and objectives.

### 5.2 The graduates' assessment of the internship's effect on job opportunities

The internship semester could be seen as a kind of bridge between the more theoretical activities at the university and the often very practically oriented tasks in a job. The graduates were therefore asked to what degree they thought that the internship had improved their chances to get a job after graduation.

Table 1 shows their response. Two thirds believe that the internship period increased their chances to a high or a very high degree. This can only lead to the conclusion that an internship semester is an important asset for most jobseekers. In several cases the graduate obtained employment in the company in which she/he had been employed during the internship. It gives the student as well as the company an opportunity to consider in depth whether they suit each other. As such, the internship has had a positive side effect in the form of the facilitation of many of the graduates' professional career start.

### 5.3 The importance of the internship to the quality of the programme and the status of the internship

Table 1 shows the positive attitude of the graduates to the internship, and Table 1 indirectly implies that the companies regard an internship to be a positive

element in the programme. In order to obtain the companies' view on internship', they were directly asked to what extent they thought it important for the programme to offer the internship as an opportunity. Table 1 shows the response.

Table 1 clearly show that the companies support, to a high degree, the idea of an internship period. 96% answered 'very important' or 'important', and there were no answers 'not so important' or 'not important'.

The designers of the review of the programme expected that the academic internship opportunity would be supported by the graduates as well as the companies. However, it would be interesting to know whether the internship should be compulsory or an option among a range of alternatives for the semester course (the present situation).

It is noticeable that the companies are distinctively more in favour of a compulsory internship than the graduates. None responded that the option should not be there. This leads to the conclusion that the internship option should be maintained. Further discussions in connection with the next revision of the syllabus should then lead to a decision about whether the academic internship should be compulsory or an option between alternatives.

### 5.4 The companies' preparedness to enter into an internship arrangement

With the importance of the internship already proven above, it is of utmost importance that the companies are well informed about the implications of entering into an academic internship arrangement. The graduates were asked to what degree the companies knew what the intended content of the internship was.

Table 1 shows the result of this question. About 40% of the graduates are of the opinion that the companies 'to some degree' or 'to a lesser degree' know the intended contents of the internship and as many as 13% replied 'not at all'. The response was confusing and to some extent discouraging: confusing, because part of the review showed a very positive outcome of and a very positive attitude to the semester. The reason may be that the company and the student during the course of the semester

'develop' a mode of internship that, in the end, gives the intended achievements. But this means that extra activities that aim to increase the companies' preparedness may improve the quality of the first part of the internship and thus increase the learning during the semester.

## 6. Conclusions

The overall conclusion of the review of the academic internship is that the internship is a very positive element in the Construction Management in the Building Industry programme. The pros and cons are discovered. In general, students and industry view an internship as an effective learning mode for learning and exchanging knowledge between industry and university. From an academic point of view, the critique is that university education is about learning theoretical and not practical skills. However, 95% of the respondents answered that to a high or very high degree, the learning corresponds to the time spent. Eighty percent of the companies involved would like internship to be compulsory. For students the score is 52%. It can be concluded that students as well as employers strongly support internship. Therefore, the academic internship semester should be included in the future syllabus, either as compulsory or as an option.

However, there is room for improvement, specifically regarding the preparedness of the companies for employing an academic internship student. Thirty-nine percent of the graduates are of the opinion that the companies to some degree or to a lesser degree know the intended content of the internship and as many as 13% replied 'not at all'. In spite of this, both students and employers evaluate the final outcome as good. A conclusion to this is that the study board should prepare guidelines for the companies regarding the intended content of an academic internship. Moreover, guidelines for the university supervisor instructing how to obtain a balance between practical and academic learning should be developed. The development of these guidelines is not within the scope of this paper, and are, hence, part of future work.

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