

The many faces of industrial designers:

Educating a hybrid of an engineer and an artist.

Eivind Prestholt

Department of Product Design
Norwegian University of Science and Technology

ABSTRACT

This article reviews competencies acquired during industrial design education in relation to competencies actually required in professional design practice and suggests improvements for industrial design education. The industrial design profession is roughly outlined touching in on changes in the profession, different roles of the industrial designer and skills and knowledge required. With a basis in surveys done at the Norwegian University of Science and Technology (NTNU) as well as in depth interviews of graduate industrial designers from NTNU a set of skills, knowledge and qualifications is identified and implications for improvement of industrial design education is made. The identified skills, knowledge and qualifications are overall understanding of projects. They have entered the “design mind set”, mastering the design process, knowing design methodology, to be able to systemize and organize, to be able to sell ideas or concepts, to be able to have an overview over work, projects and information, to be able to manage and complete a project and to be able to collaborate, communicate and negotiate. Recommendations for improving design education include emphasizing the involvement and collaboration with businesses and industry and using working/practicing designers as mentors and supervisors for projects, focusing on the building of an appropriate “toolbox” (skills like sketching, 3D-modeling, model making etc.). The article emphasizes the learning of design methodology and practice and practicing the design process to enter the “design mind set”. This will contribute to highlight the goals of the course curriculum more explicit, as well as making the students more aware of these goals and making a point of combining theory and practice.

KEYWORDS (Arial 10): Industrial design education, skills, knowledge and qualifications in industrial design.

1. INTRODUCTION

Industrial design is a diverse discipline that embodies different directions within the design profession itself (i.e. design engineering, interaction design, graphic design, furniture design etc.) as well as multiple additional professional fields. As a result the curriculum of an industrial designer often reflects a large variety in content and courses. According to S. F. Liu et al. [1] industrial designers must incorporate knowledge of multiple fields, including marketing strategies, design, research and development, basic knowledge concerning production as well

as integration management and communication skills. According to J.G. Lippincott [2] the industrial designer requires four basic elements in his training: Art, Engineering, Economics and Humanities. Although diversity in skills and knowledge can be viewed as the strength of an industrial designer, the acquisition of these abilities may pose complications. This is especially true when it comes to constructing a good curriculum and educational program for industrial designers. During the course of education, or even after, all heard thoughts and statements like: Why do we need to learn about this? Is this actually relevant for my future job?

What professional designers actually do at work and what students do at the university is very different. From these thoughts and statements, some questions arise; what are students actually left with after their education? Is what they learn and do during their education really relevant when entering the job market?

Numerous studies and published literature on design education argue that there is a gap between knowledge required at school and competencies required in practice [1, 3]. This article seeks to review competencies acquired during industrial design education in relation to competencies actually required in employment and tie this up to industrial design education.

Industrial designers educated at NTNU (Norwegian University of Science and Technology) are used for gathering information for this article. By examining and comparing the different roles an industrial designer can have in the working life, from being more an engineer to functioning more as an artist, and mapping the required skills and knowledge they need, one might get implications towards what is needed to further improve industrial design education.

The survey “Arbeidsmarkedsundersøkelsen 2010”, regarding the work situation of former students at IPD (Institute of Product Design) at NTNU, gives a basis as to what industrial designers do after they graduate as well as how they considered the content of the university curriculum in context of their work. The survey is part of a series of surveys that have been released biannually since 2002 (with the exception of 2012). In addition to this, a similar survey, “IVT Kandidatundersøkelsen 2013”, released earlier this year (2014) regarding the same subject matter from the Faculty of Engineering Science and Technology at NTNU was used.

The article will also contain a series of in-depth interviews with working industrial designers educated at NTNU: two product designers, an

interaction designer, an IUX-service designer and a graphical designer was interviewed.

2. AN EVER CHANGING WORLD

As our world changes and evolves so does, not unexpectedly, the conditions, needs and demands of our professions. This holds very much true for the field of engineering, and even more so for the field of industrial design [4-6].

Industrial design's emergence as a profession can be viewed as a consequence of the industrialization in the late 19th- to the 20th century [7]. The responsibility for designing products had previously been assigned to craftsmen, but with the acceleration of manufacturing and technical advances as well as increased consumption and demands from the public, different types of products were needed and accordingly the role of product design changed. As a result, education of designers in government-sponsored schools was initiated. It can be argued that the educational approach first found in Bauhaus, with courses centered around individual, hands-on product development became a main staple in design education for many years to come [8].

Globalization has further altered design and the way design is perceived. During the last few centuries the world has gotten smaller and smaller in terms of the ease of travel, shipping and media coverage. We no longer confine to our own regions or countries, but we get influences from almost all over the world.

As stated by M.Y. Yang et. Al [4] there are trends of industrial design practice that effect education. Among these is increased use of digital media due to emerging new technology, which in turn changes methods of presentation, sketching, rendering, model making and technical drawings. There are also vague lines between different fields within the design profession, which make it necessary for the designer to understand as well as interact more with the

other design fields. Furthermore, there is an increasing need of interdisciplinary teamwork due to considerations regarding user research, lifestyle trends, social-, psychological- and ideological issues. Another important trend is the expanded definition of products, meaning not only a product as an artifact but also including systems, services and digital interfaces [4].

These changes in conditions, needs, demands as well as change in influences and trends lead to alternations in the design profession. New design fields emerge and priorities and views change in the already existing design fields.

3. DIVERSITY IN INDUSTRIAL DESIGN

This section of the article will elaborate on some of the different roles the industrial designer might have inside the design. For the purpose of the article far from all fields of industrial design were considered, seeing as this would, in itself, entail a long and time consuming discussion.

As according to Valtonen A. in her article “Six decades – six different roles for the industrial designer” [9] the general development of industrial design as a profession has been very similar in all the Nordic countries as well as internationally. Therefore, a description of the different roles described in this article gives a good overview of the industrial design profession in general. The role of the designer as the creator refers to the designer being in full control of the design process. The inspiration and idea for the product, sketching, development and final design is all done by the designer: they are the creator and the artist behind the product. In this role the designer is elevated and almost made an object of myth, being a creative and expressive person giving form to industrially produced products. The role of the designer in a team originates from the thought of design not only being a means of product styling and aesthetics, but also a part of the product development process done together as a part of a team consisting of engineers and the marketing people. Today this is a fairly

common way of working for an industrial designer although the working teams may have broadened in terms of capabilities since the origin of teamwork in design. The role of the designer as an end-user expert came from the designer wanting to understand who he was designing for. Who was going to use the product in the end? With this the designer would not only be a part of the product development process, but also play a role in deciding what the product should be. This further distances the designer from being merely an aesthetic form giver. Design of products based on understanding the end-user and usability have become very important in the industrial design profession. The role of the designer as a coordinator, a design manager, emerged as a result of the designer working in a team and being an end-user expert. Designers became interpreters between the end-users and the different units within a company. Design management includes management of design resources in a company, but it may also include design of corporate strategy and brand experience. The role of the designer creating experiences refers to the designer being part of the planning of everything regarding design and design strategy in a company, making a total experience design. The designer creating experiences is about focusing on the experience for the end-user and making them connect to a brand on an emotional level. The role of the designer pushing innovation is natural seeing as the ideology of design is about looking at things with a new perspective and finding new solutions through creativity. Recent changes in the market and increasing global competition, such as the transfer of industry to countries able to offer it at a lower cost, and availability of products and services from almost all over the world, makes pushing innovation a necessity to assert oneself.

There is often a gliding transition between these roles and the role of an industrial designer does not necessarily confine to these six different roles, however the description above gives a good impression of what an industrial designer might do and what they might work with.

4. SKILLS AND KNOWLEDGE REQUIRED OF AN INDUSTRIAL DESIGNER

“Industrial design is the professional service of creating and developing concepts and specifications that optimize the function, value and appearance of products and systems for the mutual benefit of both user and manufacturer”[8]

One can say that the industrial designer is something between an engineer and an artist. Compared to an engineer the industrial designer seeks to make his designs not only based on calculations, construction, and technical and practical requirements, but also based user needs and aesthetics. While compared to an artist, who seeks the unique and personal in his expression, the industrial designer considers others needs and advice from other professionals in his designs [10]. From this one can conclude that there are more skills required of an industrial designer than just engineering skills and aesthetic capabilities. According to J.G. Lippincott [2] an industrial designer should also have skills in economics and humanities, but given the diversity in the design profession there may even be more skills and knowledge an industrial designer should possess.

4.1 What does the industry expect of an industrial designer?

A good place to start when mapping what skills and knowledge an industrial designer should possess is to consider what qualifications the industry looks for in an industrial designer.

Studies show that what an employer looks for when hiring an industrial designer is a designer with proficient design skills, contextual understanding, design knowledge, planning and integration capabilities, design expression and aesthetic literacy [1, 3]. These skills are all part of what one can call a professional expertise and professional behavior. W.P. Lewis and E. Bonollo

talk about five dimensions in characterization of a professional behavior [11]. These five dimensions are listed as:

1. Negotiation
2. Problem solving
3. Acceptance of responsibility
4. Interpersonal skills
5. Project management

Negotiation refers mainly to negotiation with clients, this covers task clarification as well as further negotiation with clients if the client's ideas change during the project. When talking about problem solving in the industrial design profession one can say that one talks about the design process itself since problem solving is the main goal of the design process. The design process includes concept generation, evaluation and refinement of concept, detailed design and communication of results and finally the overall skill displayed by the execution of this design process. Acceptance of responsibility refers to acting and behaving self-ruling and independently for the outcomes of your work. Interpersonal skills refer to be able to collaborate well with colleagues and clients. Lastly project management is about organizing and planning work as well as ensuring that goals are met throughout the course of the project.

This section does not elaborate on specific skills and knowledge linked to the different fields of design, as this is not directly relevant for this article, however it is reasonable to imply that a clarification of professional expertise and professional behavior may apply to a certain degree for all industrial designers regardless of their field of design.

5. FINDINGS IN SURVEYS REGARDING WORK-SITUATION AMONGST GRADUATE INDUSTRIAL DESIGNERS FROM IPD

In this section, the most relevant findings with for this article from both the survey “Arbediedsmarkedundersøkelsen 2010” and the survey “IVT kandidatundersøkelsen” are presented.

5.1 “Arbeidsmarkedsundersøkelsen 2010”

In 2010 the fifth and latest survey in series of surveys regarding the work situation of former students at the Institute of Product Design (IPD) at NTNU, “Arbeidsmarkedsundersøkelsen 2010”, was conducted[12]. The survey was organized by Leonardo, the student association of IPD at NTNU. 86 out of 174 graduate students answered this survey.

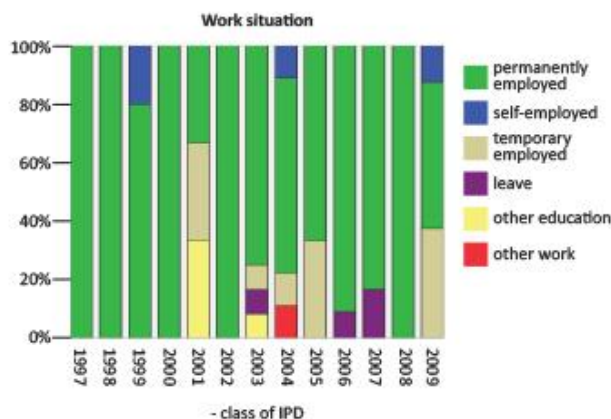


Figure 1: Work situation for graduate industrial designer at NTNU.

23% of the respondents were employed in a consultancy firm, 33% were employed in industry or offshore, 18% were employed in telecommunication, media and IT, 11% were employed in education and 15% were employed with other work. On the question about what specialist environment they work (collaborate) with 85% answered technical, 57% answered economics, marked and business, 46% answered communication and media, 16% answered health, 12% answered social sciences and humanities, and 11% answered juridical. The

questions were asked so that more than one answer could be applied. On the question regarding which tasks industrial designers do as part of their work the result was as follows: about 74% do project management as a part of their work, about 76% make presentation material, and approximately 70% do product development. Tasks that were rated in the 60-50% range were user-interfaces, design strategies, sketching, materials- and construction choices, counseling and interaction design. In the 50-40% range one finds administration, aesthetic forming, graphic design, production modifications and 3D modeling. In 40-30% one finds ergonomics, market research, physical modeling, web-design and packaging design. Below 30% one finds education and eco-design. On the questions about relevancy of areas and subjects from school, the results were; experiences from team- and group work and the design related subjects were rated very important. Other important subjects were scientific subjects (mathematics, physics etc.), design strategies, human-machine subjects and form and color subjects. Furthermore, system design, ergonomics, communications, It-subjects and subjects regarding management was rated fairly important. Workshop work, organizational work, and economics were rated less important. Lastly mechatronics and eco-design was rated least important. On questions about what method of work were most suitable for working projects both alone and in groups was rated very good. Self-study and projects in pairs were rated good. While lectures and exercises were rated least good for learning.

5.2 “IVT kandidatundersøkelsen 2013”

In 2014 the results from the survey “IVT kandidatundersøkelsen 2013” was released[13]. The participants of the survey were all graduate engineers from the faculty of engineering science and technology. In this article, only answers from the industrial design graduates will be presented. 23 of 45 graduate students from industrial design who was invited participated in the survey. 87% of the participants were at the time in permanent employment. 22% were “very satisfied” with

their current work, 63% were “satisfied”, 10% were “either or”, 4% were “unsatisfied” and 1% did not know. On the question about if their education were relevant for their current job the answers were; 31% “very relevant”, 56% “relevant”, 8% “either or” and 5% “not relevant”.

The rest of the survey the participants were given statements about relevant items, which they were asked to rate. The rating choices were strongly disagree, disagree, neither agree nor disagree, agree, strongly agree and don't know.

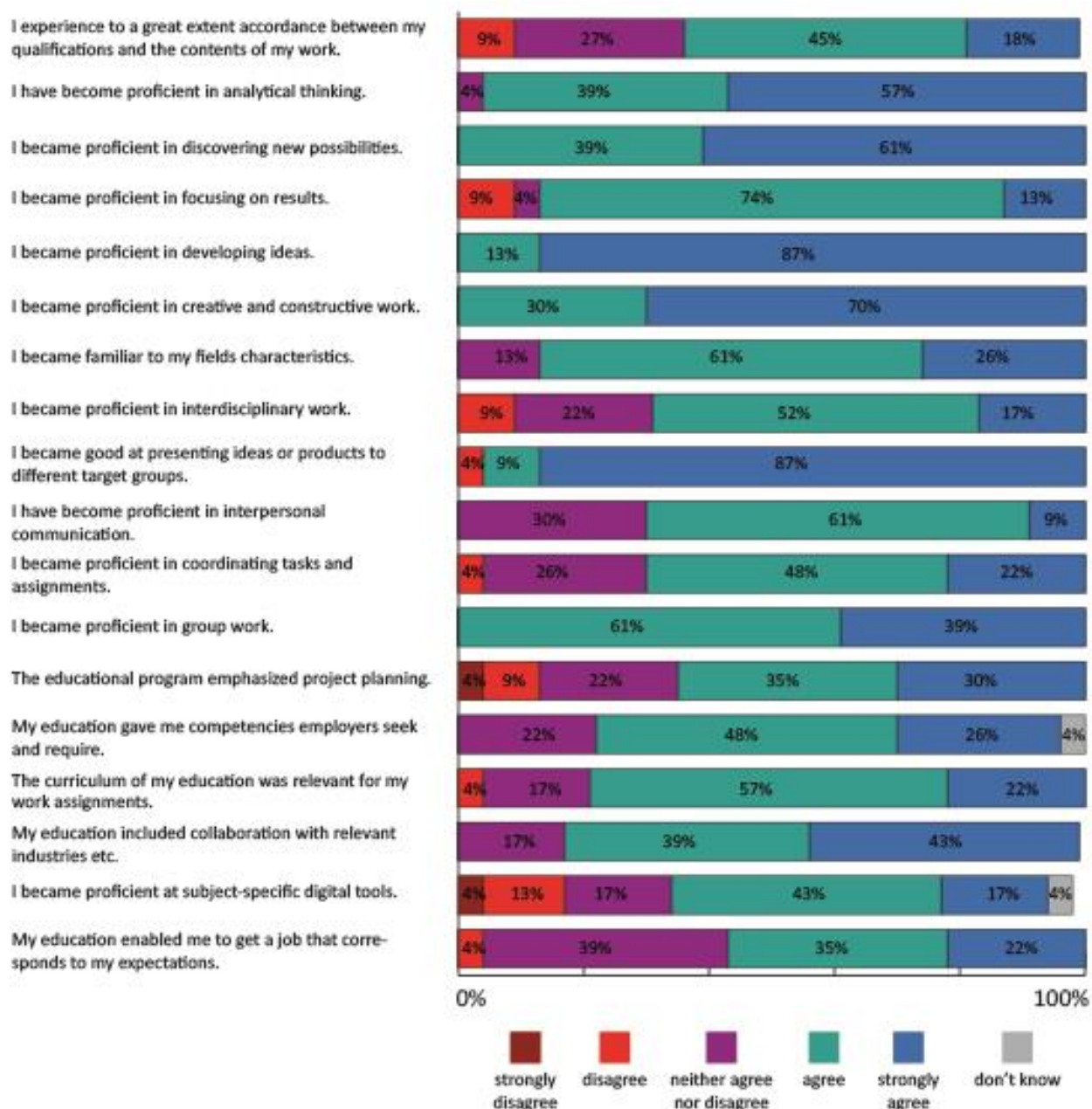


Table 1: Relevant items from “IVT kandidatundersøkelsen 2013”

5.3 Summary from the surveys

From the surveys, one can see that there is a relatively high degree of employment among graduate industrial designers. Furthermore, it seems like most designers are satisfied with their work. The most common workplaces are consultancy firms and in industry and offshore. Important collaboration environments for industrial designers include technical, economics, marked, business, communication and media. The most common work tasks were listed as project management, making of presentation material and product development. Other significant work tasks were design strategies, user-interfaces, sketching, materials- and construction choices, counseling and interaction design. Among the most relevant areas and subjects from school one finds experiences from team- and group work and the design related subjects as well as scientific subjects (mathematics, physics etc.), design strategies, human-machine subjects and form and color subjects. The preferred method of working and learning was through projects both alone and in groups. Discovering new possibilities, developing ideas, perform creative and constructive work, group- and teamwork, interpersonal communication and presentational skills stood out as competencies most respondents felt they had become proficient in through education. There were found less agreement among the respondents in the questions regarding accordance between their qualifications and content of their work, relevancy of curriculum when regarding work assignments, whether their education gave them competencies employees seek and require or not and lastly whether their education enabled them to get a job corresponding the their own expectations.

6. A CONVERSATION WITH PRACTISING INDUSTRIAL DESIGNERS

This part of the article builds on in-depth interviews of five industrial designers; all were graduates from IPD at NTNU and were in

employment at the time of the interviews. Their working fields included interaction design, IUX and service design, graphic design and product design. During the interviews the following questions were asked:

- What do you think about your role as a designer (interaction designer, product designer, etc.).
- What do you assess as important qualifications and knowledge for a designer (interaction designer, product designer, etc.).
- What knowledge, skills and experiences acquired during your education has been useful in you work?
- Critique of the course/study (recommendations for improving industrial design education, what should have more/less focus, what could/should be done different, is something lacking or missing, etc.).

6.1 The role of an industrial designer

As stated earlier the role of an industrial designer is not always explicit, and does not necessarily confine to the six different roles described in section 3. Naturally, the answers from the first question were not the same from all the interviewees, however, some similarities were mentioned. There was an agreement among almost all the designers that they have a role as one who has an overall understanding of the project. This meant understanding what their customer (as in employer or client) needs in the design, furthermore understanding could also refer to understanding the users. Another mostly collective opinion was that they have a role as one who keeps an overview. More specifically these two characteristics would present themselves differently for the various designers. For both the interaction designer and the IUX/service designer the understanding of users is very important. In order to make a successful design one has to make solutions the users can understand, want, need and can easily use. For the interaction designer this means working with structure and functionality of websites and apps.

The IUX/service designer looks at the entirety; user needs, economical needs, customer needs, technical needs etc. and ties this together in the developing of concepts and designs. The graphic designer described his role as an interpreter of ideas, in graphic design there is a focus on an audience rather than users, which makes graphic design differ from other types of design. The role of the product designer is to specify function and form of a product, they have to understand technological problems and adjust and adapt design and mechanics to this. Furthermore, both the product designers mentioned that different projects would call for them to take different roles; mainly divided into “idea and concept generators” and with this help define the product itself, and more pure product development, often with customers who already have a good understanding of what they want to make.

6.2 Skills, knowledge and qualifications needed at work

When asking the interviewees about knowledge, skills and qualifications needed at work their answers usually considered two sides; professional behavior and professional expertise. Understanding was identified as an important quality, and given their answers above on their roles as designers this was not surprising. For the interaction designer and the IUX/service designer this was mentioned as understanding of users, whereas for the graphic designer and the product designers it was mentioned as understanding of their customer. To be able to communicate well and negotiate, to be able to systemize and organize and have an overview over work, projects and information, and to be able to “sell” an idea or a concept was also skills emphasized by most of the interviewees. For the interaction designer knowledge about coding and technology was mentioned as a plus. The IUX/service designer emphasized having a perspective on the entirety, the ability to handle chaos and the ability to adapt during a process. For the graphic designer and the product designers having an “eye for design” and being able to visualize ideas and concepts was important. Furthermore the graphic designer pointed out the importance of

patience both when interacting with customers and during work. One of the product designers stated that “to know a bit about everything” was crucial to his work; this enables you to talk with customers and easier understand what the customer wants. The product designers both saw mastering of the tools one uses (i.e. sketching, 3D-modeling, modeling, handicraft etc.) as very important. Additionally being able to simplify problems, work with abstract assignments, being able to start from the ground and come up with something new and being productive was mentioned as valuable qualities and skills.

6.3 Skills, knowledge and experiences acquired during education

Also when talking about what experiences, skills and knowledge acquired during education there were some agreement among the designers. Having learnt design process and design methodology and to have entered the “design mind set” as well as having learnt to manage and complete a project, present and sell an idea or a concept, and collaborate was something almost all the interviewees brought up. For the interaction designer the emphasis on user-centered processes and user testing was useful. The IUX/service designer also mentioned the ability to facilitate creative methods and processes as a useful skill acquired during education. The graphic designer and the product designers stated that hands-on experiences such as working in the workshop, modeling, sketching and drawing, 3d –modeling, training in design software such as the adobe package etc. as essential skills obtained during the course of study. Furthermore, the product designers mentioned scientific subjects such as mathematics, physics, material and production etc. as useful knowledge together with having learnt to quickly familiarize oneself with new material.

6.4 How to improve industrial design education

When talking about how to improve industrial design education the suggestions from the interviewees were, quite surprisingly, formed more as general guidelines rather than directly

linked to their respective fields of design. It was suggested to emphasize the involvement and collaboration with businesses and industry; working with real projects and real customers, and to use working/practicing designers as mentors and supervisors for projects etc. Building a proper “toolbox” during the first three years of the study was also something the interviewees considered very important; students have to become proficient in skills like sketching, 3d-modeling, model making etc. through hands-on education. Making the goals of the course curriculum more explicit, as well as making the students aware of these goals was also mentioned as a point of improvement. Learning more design methodology and practice and drill ones design process through many smaller projects was suggested, it was indicated that this could also enable students to avoid getting stuck with insignificant details rather than the core of the problem they seek to solve. Another suggested point of improvement was to combine theory and practice, i.e. require the use of physics calculations in the solving of design tasks. The importance of finding out who you are and what you want to work with as a designer was also mentioned as a central part of the course of one’s study, to allow for this it was suggested to give students more self-initiated projects, where one chooses what to do oneself. Lastly it was brought up that the final grade in a (design related) course/subject often is based on the final result and not on the process of learning, leaving students to focus more on “flare” of final presentation rather than concentrating on improving more important aspects of projects.

6.5 Summary form the in-depth interviews

From these interviews one can see a pattern of common factors in the answers from all the interviewees. When defining the role of industrial designers regardless of which field of design they work in, although this may not hold true for all other designers, one might say that the “superior role” of an industrial designer is to be a person who has an overall understanding of a project and one who keeps an overview. Then validates for both the project itself and everything

regarding the project. If one attempts to link this up to the core of the industrial design profession, *“creating and developing concepts and specifications that optimize the function, value and appearance of products and systems”* [8], one can say that both understanding and keeping an overview may be key components in successful execution of the design process. The skills, knowledge and qualifications common for all the designers included understanding, communicational skills, negotiating skills, to be able to systemize and organize, to be able to sell ideas or concepts, and to be able to have an overview over work, projects and information. Important skills knowledge and experiences acquired from education common to the designers were; having learnt design process and design methodology, to have entered the “design mind set”, having learnt to manage and complete a project, present and sell an idea or a concept, and collaborate. Almost all the qualifications and skills mentioned above can be found in the five dimensions of characterization of a professional behavior from section 4.1. Suggestions for improving industrial design education included emphasizing the involvement and collaboration with businesses and to use working/practicing designers as mentors and supervisors for projects etc. Further the building of an appropriate “toolbox” during the first three years of the study, ample learning of design methodology and practicing the design process and to a greater extent combining of theory and practice was considered relevant. Looking back at the results section 5 it one can see that some of these points of improvement coincide with some of the items with most dissatisfaction from the surveys.

7. DISCUSSION

The article seeks to review competencies acquired during education in relation to competencies actually required in employment for industrial designers. The first sections of the article are based on literature regarding trends affecting industrial design, industrial design as a diverse profession and competencies required in

employment for industrial designers. The last sections of the article are based on surveys regarding work situation of graduate industrial designers and in-depth interviews of working industrial designers all educated at NTNU.

One might see not reviewing the content of the curriculum industrial designers go through at NTNU as a shortcoming in this article, and to some extent that is true. However, with the constant changes in the design profession due to changes in conditions, needs, demands, influences, trends together with changes in the industrial design curriculum at NTNU as well as the chance that learning objectives of subjects not necessarily are met, it might be just as beneficial to consider former students own experiences and opinions about their education.

Regarding the studies used in this article there are some limitations; firstly the middling response rates 49% and 51% as for respectively “Arbeidsmarkedsundersøkelsen 2010” and “IVT kandidatundersøkelsen 2013” the findings might not give a complete picture of the situation investigated through these surveys. Furthermore, with the studies only concerning graduate industrial designers from NTNU, the findings become somewhat specific for precisely NTNU. The later statement also holds true for the in depth interviews of working industrial designers presented in this article. It might be that there are some differences in which challenges and tasks one is best equipped to handle when coming from different schools or universities, but regardless of what school or university one has graduated from one is faced with the same challenges and tasks when entering the job marked. Consequently, it is feasible to suggest that working industrial designers can give valuable information concerning what is both needed and beneficial for improving industrial design education in general.

An interesting observation from the surveys in section 5 is that although most of the designers were satisfied with their work and expressed satisfaction with competencies acquired during

the education, the questions regarding the quality of their education are the questions with most variety (and dissatisfaction) in the answers. This ambivalence in answers may very well indicate that there is room for improvements in the educational program for industrial designers at NTNU.

Whether design education should be generalist- or specialist oriented is still a debatable issue[4]. Given the findings from the in depth interviews in section 6 it may seem as if there exist a “superior role” for industrial designers to be persons who have an overall understanding of projects and who keeps an overview over both the project itself and everything regarding the project. This together with the fact that most skills and qualifications, both needed at work and acquired during education, valued important by the interviewees also relate to this more general role of a designer may indicate that design education should be more generalist oriented. On the other hand, although not particularly emphasized, there were also skills and qualifications mentioned as important to the specific fields of design the interviewees worked in, which in turn leans toward more specialist oriented education.

According to Ivar Holm key aspects such as clients and patrons, economics, relations of authority, office management, construction management, human behavior, marketing and research are often left out of projects and (to some degree) teaching during education of industrial designers [14]. This strengthens the suggestions to include the involvement of and collaboration with businesses and to use working/practicing designers as mentors and supervisors for projects etc. as a means for improving industrial design education by letting students get accustomed to these key aspects of working life. Although, as stated by M. Y. Yang et al., universities should not neglect their ideals and goals for their students in favor for training immediately available talents for employment[4].

8. CONCLUSION

Teaching industrial design students everything they will be required to know when they start working is practically impossible, even with endless elective courses and parallel tracks. However providing a core set of fundamentals, helping students integrate knowledge across courses and disciplines and equipping them with lifelong learning skills, focusing on the “designerly” ways of knowing, thinking and acting, independent from a given application, is what might be most beneficial in terms of improving design education [6, 15, 16].

Following findings from the surveys and the in depth interviews together with the summary above it is clear that one as an industrial designer needs competencies and qualifications both directly related to one’s professional field as well as working/being employed, in other words one needs competencies and qualifications in professional expertise and professional behavior. Important competencies and qualifications include:

- overall understanding of projects
- to have entered the “design mind set”
- mastering the design process
- knowing design methodology
- to be able to systemize and organize
- to be able to sell ideas or concepts
- to be able to have an overview over work, projects and information
- to be able to manage and complete a project
- to be able to collaborate
- communication
- negotiation

In addition to the above competencies and qualifications, one needs adequate design skills related to one’s field of design.

Recommendations for a better design education are to emphasize the involvement and collaboration with businesses and industry and

using working/practicing designers as mentors and supervisors for projects to make students accustomed to key aspects of working life. Furthermore, the building of a proper “toolbox” during the first three years of the study to make students become proficient in skills like sketching, 3d-modeling, model making etc. is important. Emphasize the learning of design methodology and practice and drill the design process to enter the “design mind set”. Making the goals of the course curriculum more explicit, as well as making the students aware of these goals. Making a point of combining theory and practice so that students get a deeper understanding of the theory and how it is tied up to the reality.

Further research and evaluation for the matters reviewed and discussed in this article, mapping what can improve the quality in content as well as outcome of industrial design education, may be both interesting and beneficial for the development of the industrial design profession both in Norway and in general.

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