THE ROLE OF LEARNING- AND PRESENTATION-PORTFOLIOS IN DESIGN EDUCATIONS

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ABSTRACT
Students that primarily study design through team-based projects often struggle to develop presentation portfolios that differentiate from the ones of other students. In the industry, design managers experience this as a problem, as they often receive job applications with presentation portfolios that look very much alike. This raises doubts about the competences of the individual applicant. A solution to this problem could be to systematically generate more individual content in the form of learning portfolios throughout the design education. Based on limited knowledge about the implementation of the portfolio method in engineering design educations, this research project has investigated the method as part of a course programme. The preliminary experiments and results show that learning portfolio templates are effective in strengthening certain activities. On the other hand, the method risks draining resources from other activities, which is why the templates have to be carefully balanced in order to achieve the desired effect. The portfolio method proved to be especially good at illustrating process related competencies.

Keywords: Portfolio methods, presentation portfolio, learning portfolio, industrial design engineering education

1 INTRODUCTION
Managers of industrial design offices still expect that candidates for open positions and students looking for internships are able to present presentation portfolios that document their professional competencies. This is the conclusion of a series of visits and study trips to industrial design offices, where design managers have been encouraged to describe their respective requirements to applicants. The typical industrial design engineering educations rarely support the development of presentation portfolios directly. Thus, it seemed important to establish an overview of the requirements from the design offices and to investigate how portfolio development can be included in the educations.
"The phenomenon 'portfolio' is as an artefact regarded to be influenced by the context, in which it is used, and by the meaning and purpose ascribed to the portfolio in the specific culture and organisation" [1]. This is one of the central conclusions from the book "The Portfolio in a learning- and education-perspective" written by researchers and educators at the Department of Learning and Philosophy at Aalborg University. Within humanities, the portfolio method is closely related to the process of writing, reflecting and reformulating. It is not likely that design-engineering students will use these three terms to characterise their education despite the fact that project reports are an important part of it. However, from the interviews with eight design managers, it becomes clear that presentation portfolios related to the industrial design engineering practice are recommended to include on the following aspects:
1. Show who the applicant is as a person, including a photo and a CV, and bring forward the things that he/she is passionate about – also in the spare time.
2. Only show the things the applicant is proud of. The graphics have to be superb, and the quality of if should be expressed both aesthetically and in its function.
3. The material should be specifically selected in relation to the receiver, thus choosing a layout that allows for quick adjustment of the content.
4. Illustrate that the applicant can communicate both story and the process behind a product proposal through manual sketching.
5. It is critical to visualise knowledge about materials and production methods, e.g. through working drawings, wall thicknesses, curvatures, and drafting angles.

6. Include a case on product development with focus on project management and financial aspects.
7. Show that the applicant is able handle product details through the use of CAD.
8. Include a storyboard that demonstrates product testing through physical models like SLA, SLS or simple mockups.
9. Illustrate the applicant's competencies within the fields of LCA, service design and similar if the company is operating in those fields.
10. Show that the applicant can reduce the high level of abstraction by visualising products in real-life situations through photo essays.

The list above indicate that writing, reflecting and reformulating in relation to the design profession could be replaced by *sketching, testing,* and *developing*. The purpose of this paper is therefore to discuss the portfolio phenomenon in relation to design educations. More specifically whether or not the portfolio method has a special tenor, just as the learning portfolios and presentation portfolios of designers share more similarities with the ones from the visual arts rather than the ones from humanities.

2   THEORETICAL AND PRACTICAL BACKGROUND

The term *"learning portfolio" signals that the portfolio is used as a tool for study activities and learning and that it is not part for a formal evaluation* [2]. One of the purposes of introducing learning portfolios in the course "Experiment and process" on the 4th bachelor semester was to ensure that students were able to use theories and methods in practice and deal with specific challenges given to the students throughout the course. A series of exercises formed a type of template for the content of the learning portfolio. In the course the learning portfolio was the result of two group exercises (in project programming and ethical reflections) and four individual exercises (in semiotic analysis, semiotic design and CAD modelling of geometric and organic shapes). The idea was to allow the students to practice their abilities to communicate, which to designers is an important part of the presentation portfolio.
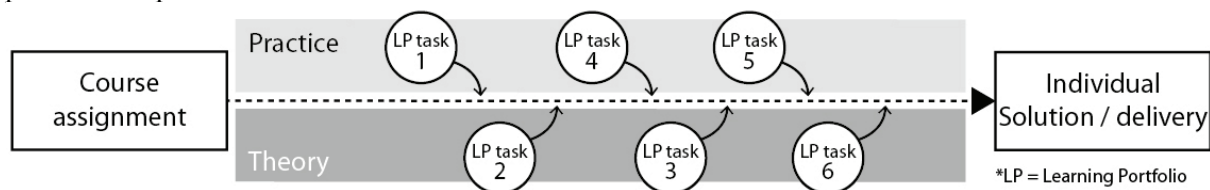

Figure 1. Practical and theoretical exercises added content to the course assignment

The learning portfolios were the objects of attention at the supervision workshops were the students worked independently. It was up to the students to choose an object for analysis and what models and methods they wanted to work with.

In a course evaluated through passed/not passed criteria, students tend to aim at lowest effort possible to pass in contrast to a course with graded evaluation. The purpose of introducing learning portfolios was therefore also to be able to gauge to what extent the students worked actively with all the theories, methods and tools from the curriculum. The learning portfolio thereby acted as a basis for evaluating the level of activity and whether or not the student take on an experimental approach to the tools, but not the quality of the solution or the graphical work.

In the experiment, the *presentation* portfolio included an unassisted, individual mini project with the theories, methods and tools used in the *learning* portfolio. During a common idea and concept presentation seminar the students received feedback on their presentation portfolios, which consisted of four sheets of A3. An external consultant from a collaborating company participated in the concept presentation seminars, and after the seminars, the students edited their respective presentation portfolios based on the feedback and their experiences from working with the learning portfolio. Finally, the portfolios were handed in for internal evaluation by the supervisor.

2.1 Consequences of Introducing Learning Portfolios in a Course Programme

The course programme "Experiment and Process" has been conducted both with and without learning portfolios. On the basis of this, the effects of learning portfolios are evaluated in relation to learning/level of activity, ability to individually develop mini projects, and lastly the level of communication. The course programme *with* learning portfolios was evaluated based on these,

whereas the course programme conducted *without* learning portfolios was evaluated based on A1 posters – a format known to the students from earlier study activities.

It was observed that the level of activity increased considerably during the workshops and the exercises helped clarify most questions. Furthermore were the exercises completed regardless of the duration of the workshops. The ability to complete the mini projects was the same in both courses, and the same was the case in relation to the covering of the technical aspects of the projects. However, the development of form and the level of communication were lower or the same at best in the course programme *with* learning portfolios. Working on the learning portfolio clearly made the students focus on theories, methods and tools rather than the other aspects. The portfolio method resulted in all students learning to use CAD modelling as part of the communication, which was a contrast to the earlier course programme.

The conclusion of the experiment is that the portfolio method based on learning portfolios with specific templates emphasise the learning goals and support the learning, but that the general competencies in communicating does not improve. This may be due to the implementation of the learning portfolio as some sort of draft or exercise. The reason for the presentation portfolios not improving the students' communication skills may be found in the general terms of the educational setup. Inclusion of portfolios should support the ability to learn through increased self-knowledge and insights about one's own weaknesses [3], but instead this is based on experience or inspiration from others. The reason for this lack of experience may be found in the admission requirements, which for this education is based on grades alone. This stands as a contrast to admission requirements for educations within the field of arts and craft, which often require a presentation portfolio. The industrial design engineering education in focus in this investigation has no tradition for the use of portfolios and only few of the students know the concept from elsewhere.

2.2 The Portfolio Method in Relation to Semester Projects

The semester project "Mechatronics and Design" on the 3rd bachelor semester was the students' first encounter with portfolios and comprises the second part of the investigation. In this case, the portfolios were uses as in the original Latin meaning of the word: *"portare"* (to carry) and *"folium"* (leaf). More specifically, the leaves were sheets of A3 with content that was pre-structured by the phases in the design process: observation/analysis, idea generation, concept development, detailing and product presentation. The aim was to maintain the student's focus on the design process rather than on written material for the traditional project report. This specific way of prioritising the resources also meant that the students got less time for incorporating the feedback from the status seminars. The term *work portfolio* is in the design profession also known as project folder: on-going documentation of the production throughout the design process [3]. The term project portfolio refers to the essence of the produced material in a project. In other words: a collection of sheets that – together with physical mock-ups – form the basis for the feedback at the status seminars. Together with the product presentation, the project portfolio constituted what could be coined as an evaluation portfolio.

2.3 Consequences of Introducing Portfolios in team-based projects

The evaluation portfolio has the summative evaluation as its main purpose, where portfolio tasks are primarily included based on what is sought evaluated. (The student's freedom of choice may be limited, as the choice may have to be decided on the basis of what is possible to compare at an evaluation) [1]. Due to this, the freedom of choice primarily lies in the selection of project vision for the student group.

During the oral examinations, the project portfolio caused some confusion to the examiner as some of the project portfolios included parts of research and ideas that did not relate to the product presentation. At the same time, some of the parts that the final proposals were based on were not included in the portfolios. It was thereby observed that the students did not reflect sufficiently upon the relevance of the content, or they did not have sufficient time for re-designing the project portfolio to support the design process for the product they ended up with. The goal of getting the students to focus on the process rather than production of a written report had been reached, but the project portfolios were at the same time more sporadically structured communication-wise, and the experiment did not improve the quality or level of their visual-communicative language.

2.4 Evaluation of the Portfolio Experiments

If we look at the initial intentions for integrating the portfolio method in the design engineering education, we are now able to recognise that some has been reached whereas other have not. The aims of putting a focus on certain learning goals and of increasing the level of activity have been realised. However, the objective of training the students' ability to communicate precisely through visual material has not had any effect. A comparison with traditional design educations in the field of arts and craft may show that the explanation is to be found in the lack of a portfolio tradition at the investigated education. The younger students do not have sufficient opportunities to benchmark their own communication skills against the work of older students.

A portfolio method that builds on the learning portfolio, and that includes templates related to the learning goals, should also include some guidance for assisting the students in developing a visual-communicative language. The book *Portfolio Skills* by Kevin Henry [4] was used as a reference during the interviews about design managers' recommendations to presentation portfolios. It would be obvious to use this or similar books as a "mirror" in the portfolio implementation phase. Design manager Bo Lindemann [5] pointed out that it is important that the students develop their own personal style. Lindemann receives presentation portfolios from international students, and according to him, these are often so generic that it is impossible to decipher the personal style and identity of the applicant.

3 THE PORTFOLIO METHOD IN INDUSTRIAL DESIGN EDUCATIONS

With this paper, we have put focus on design offices' recommendations for portfolios with the purpose of identifying the pieces in a portfolio method for the industrial design engineering education. The portfolio method must – as the design managers also point out – emphasise the visualisation of technical competences, illustrate skills in simulation and model testing, exemplify communication through storyboards and illustrate cases of product development, and lastly it should express the personal identity of the applicant. A strong visual-communicative language rich of information is key whereas short, precise sentences only acts as a supplement when the visuals come short.

This may be a portfolio method that builds on radically different pieces that the ones mentioned in the book "The Portfolio in a learning- and education-perspective" [2]. On the other hand, the portfolio method seems so open that the "language" is not decisive, when just the pieces are consistent with Lauvås and Jacobsen's list of what characterises the diversity of portfolios in higher education. These are [6]:

1. *The characteristics of the professional domain*
2. *Preconditions of the students*
3. *Objective and aim of the education*
4. *The broadness of the competence that is needed, together with interests, fantasy and ambitions from the creator.*

Communication through a visual-communicative language is a characteristic of the design profession that distinguishes it from the humanities just as the professional content.

3.1 A Template for the Portfolio Method versus Personal Learning Goals

For the younger students, the immediate goals are often primarily to achieve high grades. During the course of the education, the students start to reflect upon their learning in relation to their future profession, and company visits, lectures by external designers, and meetings with earlier students all add to a clearer picture of the profession. As the portfolio method focuses on the personal learning, it may be undesirable that the pre-structured templates, used in the two investigated cases, do not give much room for personal preferences. Using a visual language also means that the student's reflections first and foremost have to be deciphered through the content of the sheets and through the student's choice of motives, illustrations and layout.

According to the portfolio method mentioned by Lund [1],[2], students should write down their own personal learning goals in the beginning of a course programme, and these should be included in the criteria for the evaluation. The education in this investigation has not prioritised the development of individual learning goals as it may be the case in some art schools. Instead the education in focus here has chosen to implement specific learning goals for each of the many study activities. Personal learning goals could in this case be replaced by a common agreement on evaluation criteria for graphics, layout and the visual-communicative language by letting the students contribute with

examples that illustrate good communication.

4 THE DIDACTIC GOALS OF THE PORTFOLIO

In general, Pettersen's model on change strategies in teaching covers the learning strategy for the course programme "experiment and process". The three levels of the model by Pettersen [7], [8] is shown in figure 2 below. Whereas the model shows the level of professionalism of the teacher, the three levels can also in a similar way be seen as a measure of the student's ability to learn and reflect:
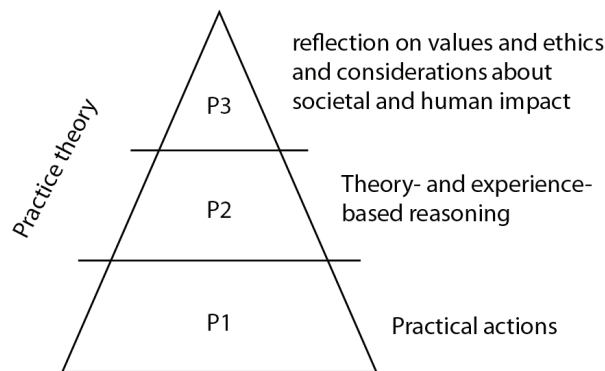

Figure 2. The didactic pyramid of practice [8]

During the course programme "Experiment and process", the aim was to facilitate learning on all three levels. Four of the lectures in the course focused on parametric construction in CAD. The learning activities in these lectures revolved around an approach that included simple tutorial-based instructions in the software. This trained the students' *technical skills* and facilitated learning on a practical level (P1).

The second level (P2) relating theory- and experience-based reasoning is utilised during course activities on project programming, semiotic analysis, and development of form as well as during ethic reflection. The students go through a practical testing of the theory and methods presented in the course.

The third level (P3) relating to reflection on values, ethics, and considerations about societal and human impact was brought into play in the individual part of the course. The students should engage in ethical reflections and bring the appropriate knowledge and methods into the course.

The portfolios should reflect the learning of all three levels and the students got feedback from a professional within the field of practice on which the projects revolved.

5 INPUTS TO APPLICATION-ORIENTED PRESENTATION PORTFOLIOS

Besides the attempt to increase the learning outcome of the course, the learning portfolios were also brought into play in order to prepare students to the portfolio format as it is typically part of job and internship applications. The design manager Thomas Harrit [9] recommends the students to choose a layout for their presentation portfolio that will work as independent sheets, each presenting specific competences. With a portfolio of 10-15 sheets, it should then be possible to convince a potential employer that the applicant possesses the qualifications that match the company's needs. The real question is, then, whether or not the work with learning portfolios, project portfolios and presentation portfolios during the education will help the student to realise what specific competences he or she possesses, and how the competences can be documented in the portfolio. During the visits to design offices, it became clear that design managers struggle with many almost identical portfolios from applicants. The individual presentation portfolios developed during the various course programmes could in principle be used even though the have been made in order to document fulfilment of certain learning goals and may not present specific competences.

The design manager Peter Møller-Jensen [10] emphasised the importance of design engineers being able to communicate through sketches during discussions with collaborators. Learning portfolios could in this case be used as a focussed tool for developing a strong visual-communicative language, which would be critical in this regard. Finally, the project portfolio is the ideal format for collecting material that will document and illustrate a case on product development. The company of design manager Jacob Brahe-Pedersen [11] uses this as part of their practice.

6   CONCLUSIONS

This research project has been exploring the role of learning- and presentation portfolios in design education. A case on a specific course programme has been investigated and interviews with design managers from practices have been carried out. It has become clear that, even though there is no strong tradition for learning portfolios in some engineering design educations, the portfolio method share some characteristics with presentation portfolios well known within the design practice. During this project, it has become clear that learning portfolios have a strong potential when it comes to directing the students towards the desired learning goals as long as this is clearly supported by explicit instructions and templates. However, it also became clear that most students in the investigated case were in lack of a sufficient visual-communicative language that would enable them to reach the full potential of the portfolio method.

During this research project it has also become clear that learning portfolios may serve an important purpose when it comes to creating personal content for a future job application. Design managers in a series of companies emphasise this aspect.

This research paper aims at initiating a discussion about how learning- and presentation portfolios can be efficiently implemented in design engineering educations that may not have the same traditions of portfolio-building as traditional arts and craft schools. The case investigated here shows that the method has a strong potential and is able to carefully direct students towards fulfilment of highly specific learning goals.

ACKNOWLEDGEMENTS

REFERENCES

[1]   Lund B. Læringsteoretiske begrundelser for portfolien som pædagogisk redskab i en skandinavisk tradition. *Portfolio i et lærings-og uddannelsesperspektiv*, 2008 (Aalborg Universitetsforlag, Aalborg).

[2]   Lund Birthe red. *Portfolio i et lærings-og uddannelsesperspektiv*, 2008 (Aalborg Universitetsforlag, Aalborg).

[3]   Krog L., Lund B. and Jensen A. A. Portfolioevaluering og nye eksamensformer. *Portfolio i et lærings-og uddannelsesperspektiv*, 2008 (Aalborg Universitetsforlag, Aalborg).

[4]   Henry K. Drawing for Product Designers, Portfolio Skills Product design. 2012 (Laurence King London).

[5]   Lindemann, B. Kontrapunkt, Nikolaj Plads 2, 1067 Copenhagen. Visited 2013-11-15.

[6]   Lauvås P. and Jakobsen A. *Exit eksamen – eller?: former for summativ evaluering i høgre utdanning*, 2002 (Cappelen Akademisk Forlag, Oslo). p. 241.

[7]   Krog L. Undervisningsportfolien *Portfolio i et lærings-og uddannelsesperspektiv*, 2008, (Aalborg Universitetsforlag, Aalborg).

[8]   Pettersen, R.C. *Problemet først: problembaseret læring som pedagogisk idé og strategi*, 1997 (Tano Aschenoug, Oslo). p. 117.

[9]   Harrit, T. Harrit & Sørensen, Holt Stationsvej 20, 2840 Holte. Interviewed 2013-11-18.

[10] Møller-Jensen, P. Møller-Jensen Innovation og Design Aps. Nyhavn 39 DK-1051 Copenhagen. Visited 2013-11-15.

[11] Brahe-Pedersen, J. Brahe Design, Onsgaardsvej 33, 2900 Hellerup. Interviewed 2013-10-18.