Exemplary learning in design studies - strengths and limits

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Abstract

In design study programs students normally spend a large amount of time creating practical solutions to design problems. In particular, in a problem-based setting, students may work throughout a whole semester on a self-elected design problem. To what extent does the principle of exemplary learning provide justification for an examples-based approach to design studies? The paper interprets Martin Wagenschein and Oskar Negt's original work on exemplary learning, taking the well-known metaphor about examples that 'mirror the whole' to mean a requirement that examples should point to a field's generic or universal content. This suggests that exemplary learning is strong with regard to universal design knowledge, but has limited value with regard to knowledge which is bound to a specific context. The work of design theorist Herbert Simon is cited to provide examples of generic design knowledge, and conversely, the work of Donald Schön is cited for examples of design knowledge (or knowing) that is not universal because it is bound to context. Working with design examples may be a good idea regardless of whether the principle of exemplary learning applies, but may then require a justification of its own, such as motivation of students or simply learning the details of a field in their own right.

1. Introduction

The concept of exemplary learning was central in university reform efforts in Denmark in the 1970s and 1980s, when key developments included the formation of new universities in Roskilde and Aalborg in 1972 and 1974. The concept originates in the German didactic tradition and the critical theory of the Frankfurt school. A key contributor in the 50s and 60s was Martin Wagenschein (1956). His work inspired reform efforts mainly in the natural sciences. The concept of exemplarity was re-formulated as an emancipatory and political principle for workers' education in the 1970s by Oskar Negt (1971; 1975). Within the university sector, Negt's work was most influential in the humanities and the social sciences. The important role played by Negt as an inspirational figure was indicated by Roskilde University's award to him of an honourable doctoral degree in 1997.

A good starting point for a definition of exemplary learning is the metaphor, suggested by Wagenschein and discussed subsequently by Negt, that an example should mirror the whole in order to be suitable for exemplary learning. Definitions may differ in their interpretation of the notion of the 'whole': the entirety of a field or just some generic aspect of it? Wagenschein and Negt can be said to require that examples mirror the essence of a field, so they are both on the ambitious side. A more pragmatic definition is suggested in Aalborg University's draft standards document on problem-based learning (Barge, 2009):

" [..] a problem needs to refer back to a particular practical, scientific and/or technical domain. The problem should stand as one specific example or manifestation of more general learning outcomes related to knowledge and/or modes of inquiry." (p iv).

The paper uses Barge's reformulation, with its somewhat vaguer requirement that examples should represent *some* general learning outcomes, not the whole essence of a field. This is to avoid criticism that the real source of the paper's conclusions about the limits of exemplary learning is an overly narrow definition of exemplary learning. The pragmatic definition is sketched in Figure 1.

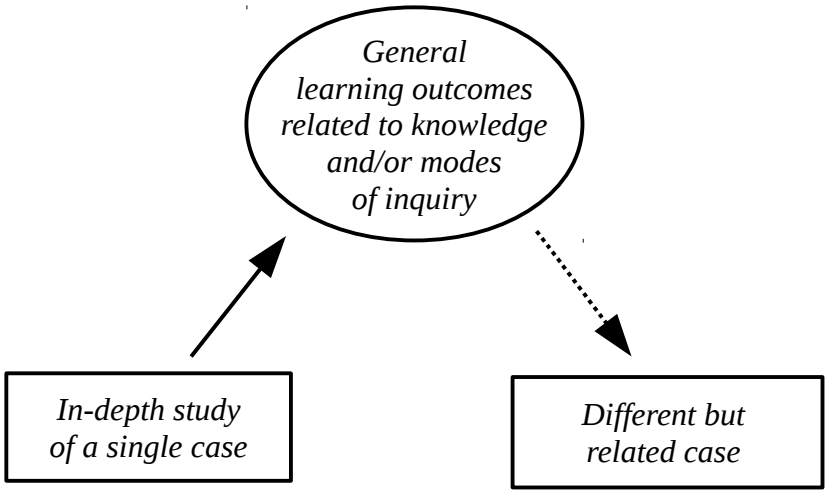

Figure 1. Exemplary learning spelled out: a case, a generic learning outcome that the case exemplifies, and an potential application to another case.

Design as discussed in the present paper can be defined as *"the process of consciously shaping an artefact or system to adapt it to specific goals and environments"*. This definition is rather broad, and covers design fields such as software design, media design, and urban design, as well as many others. It is a variant of a definition given by Feng and Feenberg (2008). Table 1 below exemplifies the design definition with three design problems studied by project groups at the Humanities and Technology Studies program at Roskilde University (in 2009-2010):

- Design of an educational computer game about school mobbing.
- Re-design of Blaagårds Plads, a city square in a multi-ethnic part of Copenhagen.
- Re-design of a soap dispenser so as to play music when used, to enhance hygiene.

Table 1. Three design problems within the scope of the paper's design definition.

An investigation of exemplary learning in design studies may be of interest for at least two reasons:

Firstly, in recent years many universities have started new study programs with a major design component. In Denmark, in addition to the program at Roskilde, which was launched in 2008 and attended by 225 new students in 2011, new programs include a program in Architecture and Design at Aalborg University. In 2011 this program received the greatest number of applications among all programs within the university's area of technical and natural science in 2011. (The statistics source is KOT, 2011). There are also

new design-oriented study programs at most other Danish Universities. Many of the new design programs span several different design fields. The two programs I have mentioned at Roskilde and Aalborg cover urban design, environmental design, and software design. (Table 1 above indicates that this is the case for the program at Roskilde).

A major challenge facing a multifield design study program is that if design cases are from different design fields, the cases may be unrelated in terms of knowledge or other learning outcomes. It may not be feasible to transfer knowledge acquired in one field, such as software design, to another field, such as urban design. In order words, the process illustrated in figure 1 above may not apply if the two cases do not share a substantial portion of knowledge. There may be several good reasons for a design program to focus on design examples/problems, such as motivation of students. The question I want to explore here is merely whether the principle of exemplary learning is one of these reasons.

Secondly, the topic of exemplary learning in design studies has not been subject to analysis in the literature, neither the didactics and learning literature nor the design theory literature.

Within the didactics and learning literature, the original works of Wagenschein and others on exemplary learning focused on universities' classical areas of study, that is, natural science, social science, and the humanities. Recent didactic literature on problem-based learning take engineering and other design-related fields under consideration; however, this literature does not discuss whether design fields pose specific challenges. For example, the Aalborg standards document on problem-based learning does not distinguish between different areas of study.

Within the literature on design theory there has been considerable focus on educational issues in general, but not on the specific approach of exemplary learning, as far as I know. The contributions of the design theorists Herbert Simon and Donald Schön may be of particular interest in this context. Simon and Schön can be seen as significant representatives of what Nigel Short terms a first and sescond generation approach to design methodology (Short, 1993). Simon may be seen as a representative of the first generation of the 1960s, which aimed at rational, scientific methods. Schön may be seen as a representative of the second generation design theorists of the 1970s, which aimed at user involvement in participatory design processes. Moreover, both Simon and Schön were preoccupied with educational issues. They both criticised that in the United States, in the decades following the Second World War, there was a tendency to remove the topic of design from the curriculae of design-oriented study programs, and to focus instead on the supporting sciences, e.g., engineering education based on the natural sciences. The design definitions given by Simon and Schön were broad and consistent with the design definition given above in the present section.

Simon did not discuss the topic of exemplary learning. Schön did discuss the role in teaching of prototypical examples (Schön 1988), however, this was with reference to physics cases suggested by Kuhn (1977), rather than to exemplary learning in the German didactic tradition. Although Simon and Schön did not themselves discuss the exemplary learning approach, we may ask hypothetically if they would have liked the approach - given their respective views of design.

The paper is organized as follows: Sections 2-4 discuss Wagenschein and Negt's work on exemplary learning. Sections 5-6 discuss Simon and Schön's theories on design, and how they match exemplary learning. Section 7 concludes.

2. Wagenschein: exemplary learning in the natural sciences

Martin Wagenschein introduced the metaphor of mirroring of the whole, and he took the metaphor quite far. His analysis was rooted mainly in his own field, physics, and its supporting field, mathematics. The natural laws of physics constitute a 'whole' that is uniform and well-defined, and which is understood to govern all physical phenomena. As I understand Wagenschein, he believed that a few examples suffice to bring the whole field into play.

Martin Wagenschein's work on exemplary learning dates to early postwar Western Germany, where he was a leading figure in a pedagogy reform movement. A focal point of the movement was a pedagogy conference held in Tübingen as early as 1951 (Krüger 2008). One of Wagenschein's most well-known papers is *Zur Begriff exemplarischen Lehrens* (1956). Page numbers given below refer to the English version (Wagenschein 2000).

In his criticism of traditional didactic approaches, Wagenschein made several points that are familiar in contemporary discussions. He used the notion of Stof-Fülle (curriculum overcrowding) to characterize the prevailing, general situation where disciplines had to much to teach. He criticised a stepwise, linear approach, where students were taught 'everything', beginning with, say, in biology the single-celled organism or in mathematics the axioms. These traditional approaches would lead to haste and lack of thoroughness, and also they would not motivate students.

Wagenschein viewed exemplary learning as a universal didactic principle, relevant throughout one's education from primary school to university. In his criticism of prevailing approaches he used examples from many different fields of the natural sciences. In Wagenschein's analysis of the problem of selecting good examples, however, he used examples from physics and mathematics. Wagenschein gave the classic physics example of a stone dropped from a tower (2000, p167). The exploration of this case leads to several generic topics, including that of gravity and Newton's second law of motion, and - depending on the depth of the exploration - possibly more advanced issues such as earth's curvature.

In a more specific analysis, Wagenschein asserted that examples should provide a basis for learning both *elementary* and *fundamental* aspects of a field. The concept-pair elementary/fundamental is rooted in the German didactic tradition and the philosophical tradition of phenomenology, and may be sketched as follows based on a discussion by Krüger:

The elementary is “concentrated, that is, reduced, educational content”. It is related to the question “Has someone learned something?” (Krüger 2008). In the context of physics, for Wagenschein the elementary is “nature reduced by physics” (p170). By this phrase Wagenschein referred to the physical laws, for example the laws of classical mechanics such as Newton's second law of motion, *force = mass * acceleration.*

In contrast, the fundamental is “the educational impact of a selected and reduced content on the being and existence of the learner”. It is related to the question “Has the learner's relationship to reality, i.e. his or her being-in-the-world and lifestyle changed?” (Krüger 2008). For Wagenschein, the fundamental may be, for example, the experience of the measurability of a natural phenomenon, or of being the measuring subject in the subject-method-object triangle, or of a natural law that determines the behaviour of matter and is

expressible in mathematical form (Wagenschein 2000, p171).

In terms of Barge's distinction between knowledge and modes of inquiry (see Section 1 above), the elementary is related to the former, and the fundamental to the latter. To sum up, I read Wagenschein's reference to both elementary and fundamental aspects as a requirement that examples should mirror the essence of a field.

3. Negt: the humanities and social sciences

Oskar Negt's major work on exemplary learning is concerned with workers' political education. Even though this area of education is different from those considered by Wagenschein, Negt did build on many of Wagenschein's ideas, and in particular, Negt had an ambitious notion of what it meant for an example to mirror the whole.

Negt in *Sociologische Phantasie und exemplarisches Lernen* (1971) suggested a reform of workers' education. The aim was to change educational programs organized by the trade unions in Germany, including the largest trade union, IG Metall, that Negt himself worked for while a student. At university, Negt was a student of Theodor Adorno, the key figure of the Frankfurt School of critical theory. Negt saw exemplary learning as an approach to liberate workers by providing them with an insight into the interplay between their own life-world and capitalist society as a whole, and the ability to act politically based on that insight. The page numbers given below refer to the Danish translation (Negt 1975) of the work mentioned above.

Similarly to Wagenschein, Negt considered the problem of determining whether an example is suited for exemplary learning. Negt suggested three criteria, which highlight his focus on workers' political education. Negt used the German noun Fall, which perhaps translates better as case rather than example. Cases should:

(1) be close to the workers' life world, to motivate the learner/worker;

(2) bear relation to the societal totality, so that this relation could be unfolded from the case in the course of the learning process; and

(3) be related to the liberation of workers, in the sense that the case when analyzed in its full context would point to a possible road of political action (p 93).

Negt's rather detailed discussion of the three criteria contains a suggestion that two fields, labour law and technology, would be particularly useful as suppliers of learning cases.

Negt referred to Wagenschein's mirroring metaphor, and like Wagenschein he insisted that cases be 'unfolded' to the whole. Negt re-defined the whole as follows: “The whole is the labour-divided totality of society's processes of production and reproduction in a historical dimension” (1975, p44). This view of the whole is summed up in Negt's requirement (2) above. More specifically, Negt meant society as understood in sociology. It is reasonable to read Negt's concept of sociology as referring to society as understood in the critical theory of the Frankfurt School. I read Negt as requiring, like Wagenschein, that examples should mirror the essence of the whole, the whole being society in Negt's case.

There is another parallel between Negt and Wagenschein: Negt considers exemplary learning as a generic approach, while at the same time his specific analysis is about a more narrow field.

Negt's view of exemplary learning as a generic approach is present already in his work in 1975, where he said there was a need for extending exemplary learning to all fields of education because of the growth of scientific knowledge (p34). This argument is similar to Wagenschein's argument about Stof-Fülle (as described in section 2 above). Negt characterized his own remarks on the topic in (1975) as preliminary, and insisted that building an extended, general theory of exemplary learning was a complex task that required much further analysis. Negt (1977) pointed to “students' interests, experiences, and their horizon of cognitive associations” as the (generic) basis for the selection of good exemplary examples (p25). Again, however, this was a statement of opinion, and not supported by analysis.

Negt's specific analysis (1975) concerns the specific topic of workers education in the historical context of post-war Western Germany. Negt's reasoning about worker's consciousness focused on their allegedly false and compartmentalized view of society, where spheres of society, such as the spheres of politics and the work place, were seen as unrelated. He explained this phenomenon using a historical analysis of the traumatic experiences of the Weimar Republic's collapse, the Nazi regime, and the war (1975, pp 94-97). Negt's later work includes “Öffentlichkeit und Erfahrung” (Negt & Kluge 1972), which sets forth a theory of workers' consciousness. Negt has also proposed a set of six core competencies for worker's education. These include, e.g., a technological, an ecological, and a historical competency, and can be seen as Negt's concretization in terms of content of his exemplary learning approach (Nielsen 1997, p279). All in all, the topic of the general educational system is simply out of scope of the proper analysis by Negt in (1975), and he did not in his later work pick up the task of building a general theory of exemplary learning.

Negt can be viewed as suggesting a re-interpretation of exemplary learning as an emancipatory principle. By contrast, in today's terminology, Wagenschein understood exemplary learning as a didactic principle. Negt dismissed Wagenschein as a representative of bourgeois pedagogics. Conversely, critics of Negt, such as Laursen (1991), hold that Negt's theory of consciousness assumes that there is one correct form of consciousness that the learner should acquire, and that the theory therefore is one-sided rather than emancipatory. Indeed there may be some resemblance between any 'universal truths approach' regardless of whether it is based on the universal truths of physics or the Frankfurt School.

4. A pragmatic re-interpretation of Wagenschein and Negt

The paper's choice of Barge's pragmatic definition of exemplarity (see Section 1 above) as the basis for the remainder of the paper avoids Wagenschein and Negt's universal truths. In concrete terms, this means that examples are not required to point to the whole of a field, or a field's essence, but merely to some generic learning outcome. At the same time, Barge's definition retains the fundamental duality between case and general learning outcome, expressed by Wagenschein and Negt in terms of the mirror metaphor.

The discussion of exemplarity in Knud Illeris' work on project based learning (1981), which was highly influential in Danish educational reform efforts, can also be seen as a pragmatic interpretation and development of Negt's ideas. Illeris (1981) reformulated

Negt's criteria (see Section 3 above) as the subjective, objective, and action criterion. For example, Negt's third criterion was that cases should be related to workers' liberation; this becomes Illeris' action criterion, which refers to the active involvement of the learner, or rather group of learners. Active involvement was a broad concept and could be students actively searching for literature (p 114). Illeris also added a fourth criterion, the relevance criterion, which said that examples should be relevant to the study program - in other words, another pragmatic requirement.

The definitions of exemplarity given by Barge and Illeris are not far apart. Perhaps one should prefer Illeris' definition, since in Denmark it is the most well-known and influential. The main reason that I hesitate to simply use Illeris' criteria in the sequel is that Illeris, like Negt, focuses on criteria for selecting examples. I feel that this tends to assume that the method of exemplary learning is always sound, and that the problem is only with the examples. By contrast, given Barge's definition, it is natural to ask the following more constructive question: what part of design-related learning outcomes are of a general nature, so that they manifest themselves across a range of different examples?

5. Simon: generic design knowledge

In *The Sciences of the Artificial* Herber Simon proposed a curriculum for a science of design. Simon envisioned a generic design curriculum that could be taught at all schools of professional design, including engineering schools and business schools. Since Simon believed that design problems in different fields could be approached using design theories and methods of a generic nature, his curriculum appears to be well suited to an exemplary learning approach. The first edition of the book was published in 1969; page numbers below refer to the third edition (Simon, 1996).

As a starting point, Simon complained that after the Second World War, “[E]ngineering schools gradually became schools of physics and mathematics; medical schools became schools of biological sciences; [..]” (p 111). The scientific ideal of the design science that Simon wanted to develop would be the rigorous analysis, formalization, and exactness of the natural sciences. Therefore, lack of rigour would be no argument against inclusion of design in a curriculum. Simon's focus on generic theories and methods was rooted in this natural science ideal.

As I interpret the design curriculum proposed by Simon, it can be divided into two parts that are of a somewhat different nature. The first and major part is based on computer science and mathematics, comprising five out of seven curriculum topics listed by Simon (p 134). This part consists of algorithms for problem solving, including methods from operations research, such as linear programming, and newer algorithmic methods such as various kinds of heuristic search. Simon was also interested in and suggested various new concepts related to algorithmic search, including satisficing (find a solution the meets the requirements) as and alternative to optimizing (find the optimal solution). The mathematical topics included formal logic for problem description, and statistics and probability theory. Simon gave the example of a diet problem: given facts about the nutritional content and prices of various foods, and given certain nutritional and financial constraints, what is a week's optimal (or satisficing) diet? The computational methods that can be used to solve this problem can be justified in a way that meets standards of rigour and formal proof, crucial to Simon. And the student that works with the diet problem will

learn a completely generic problem solving method, equally applicable to a wide range of quantitatively defined design problems.

The second part of Simon's curriculum is process-oriented and less formal. This sets forth a topic Simon called “Theory of structure and design organization: hierarchic systems”. Complex structures can be viewed as hierarchies of substructures, and the design process can be organized accordingly, for example as a top-down design process that begins with overall-design and then moves on to component design. This less formal part of the curriculum also includes what Simon calls an empirical approach, and by which he means an experimental approach as in prototyping. Simon gave the example of the development of the first time-sharing operating systems for computers in the early 1960s. He stated that development had to proceed essentially by building a system and seeing how it worked, in successive stages. This was because at that time, there was no theory of operating systems and how to build them (Simon, 1996, p20). While less formal than the first part, Simon's topics of hierarchy, design process, and experimental evaluation were seen by him as being of a generic nature as well. For example, experimental evaluation was simply the universal experimental method of the natural sciences.

In conclusion, Simon viewed design problems as either formally defined, in which case they can be solved with math and computers, or less formally defined, in which case they can be approached using other generic methods. Although the title of Simon's book referred to science in the plural, what Simon aimed for was a single, unified science of design.

6. Schön: contextual design knowledge

Schön's view of design is directly opposite to that of Simon. An overall theme in Schön's work is his critique of technical rationality. By this term Schön refers to design theories that have the natural sciences as their scientific ideal. An example is the theory of Simon, whom Schön criticized explicitly (1987, p309). Schön is also of interest in the context of exemplary learning, because he focused on the role of practice, in other words, working with examples. In *The Reflective Practitioner* (1983), Schön focused on the contextual aspects of professional design practice; subsequently, in *Educating the Reflective Practitioner* (1987), he stressed practice as a key component in design education. He suggested that the educational environment be inspired by the architectural studio, and proposed a 'practicum', not a curriculum.

Schön was highly sceptical about the value of generic, rigorous knowledge in professional design practice. He asserted that 85% of the problems a medical doctor sees are not in the book(s) taught at medical school (1983, p 16). Schön asserted that the professional designer (which he defined so broadly so as to include a medical doctor) faces a dilemma of rigour or relevance: “Shall he remain on the high ground where he can solve relatively unimportant problems according to prevailing standards of rigour, or shall he descend to the swamp of important problems and nonrigorous inquiry?” (1987, p3).

Perhaps Schön's most significant point vis-à-vis Simon is that in a practical design situation it may not be clear in the first place what the problem is. In the swampy lowland, there are “messy, indeterminate situations” rather than well-structured problems. Given a

situation with malnourishment among children in a developing country, the problem may very well be one of nutrition (recall Simon's diet example mentioned in Section 5 above). But depending on the context, it might also be reasonable to approach the situation as a problem of food production, disease, or population growth (Schön, 1987, p 5). A road construction engineer can use generic technical knowledge about soil and construction technologies to build a road, but before doing so, the engineer ought to consider contextual factors, including environmental, political, economic and others, to help determine what road to build. The context may contain so many potentially relevant parameters that they can not be represented in a finite model (p79).

Schön's concept of reflection-in-action is intended to capture the way in which designers come to grip with the maze of ill-structured problems. They define and re-define the problem, a process requiring improvisation rather than application of generic method (Schön, 1987, p 5). A significant portion of a designer's knowledge of how to do this is tacit, according to Schön. In an architectural studio in a school, the teacher may not be able to explain to the student how he or she should proceed, because the knowledge escapes rules that can be stated clearly. In some cases, the teacher may be able to formulate, say, a certain rule, but when stated verbally it does not make sense to a student who does not have prior practical experience (1987, p 100). Schön uses the "knowing" to underscore the tacit and action-related nature of such knowledge.

Despite Schön's emphasis on tacit knowledge and improvisation, he does suggest several elements of explicit design knowledge and method. He observes that a designer may utilize a repertoire of patterns obtained from previous experience. Such patterns can, at least to some extent, be made explicit and brought into the classroom, or the student-coach dialogue in the studio. The remainder of this section sketches three areas of generic design knowledge and method suggested in Schön's work.

Firstly, *seeing-as* occurs when a design resembles a previous design. Schön in his discussion of seeing-as uses examples from architecture. Architects make use of what he calls types. He describes these as general categories, but of a sort that associates to rich, particular content as well. Schön suggested a classification into four kinds of types (Schön, 1988). One type is the functional building type, for example a "branch library". Architects may share a portion of knowledge that typically holds about a given type, such as a local library building, and which may inspire the architectural designer in a given context. Another type is experiential archetypes, which captures a person's experience of an architectural element, for example, an entrance that is experienced by the person as open and draws the person inside. The knowledge or knowing captured by architectural types is generic within the domain of architectural design, but is presumably not applicable to other fields of design.

Secondly, *doing-as* occurs when a design activity resembles a previous activity. In his analysis of doing-as, Schön says that a designer's action is essentially experimenting. Schön distinguishes between three experiment types: exploratory, move-testing, and hypothesis-testing experiments. Exploratory experiments are conducted to see what happens, without expectation about the result; move-testing is to see the effect of a design move, that is, a presumed positive design change; and hypothesis-testing is examining a specific cause-and-effect relationship among parameters in the design situation or problem (Schön, 1987, p 68f). Schön's sketch of a repertoire of experiment types does not refer to a particular design field; however, it would be in spirit with Schön's view of design to

assume that, say, selection of relevant experiment types is a domain-specific competency.

Thirdly, *theories-in-use* are approaches or attitudes that a designer brings to the scene of design. Theories-in-use are significant in processes of cooperation and negotiation. Schön distinguishes between Model I, with strategies and assumptions such as “Achieve the objective as I see it” and “Be rational”, and Model II, which is oriented to dialogue and cooperation. These issues of informal strategy and attitude may bear resemblance to Wagenschein's notion of the fundamentals of a field, that is, the learner's more personal relationship to a field, as discussed in Section 2 above. Schön reports experiences from teaching these aspects of design processes to students from diverse fields of design (Schön, 1987 p255), indicating that Schön sees the topic as relevant to design in general.

7. Conclusion

Table 2 below summarizes the rather different views of design advocated by Simon and Schön, as discussed above in Sections 5 and 6.

Design theorist	***Areas of generic design knowledge and method identified and emphasized by the theorist.***
Herbert Simon	*Computer science topics, including algorithmic search* *Mathematics topics, including logic, statistics, probability theory* *Structure, that is, understanding how a design process can be organized on the basis of the hierarchical structure of the design product* *Experimental approach to problems that are not fully understood*
Donald Schön	*Seeing-as: a repertoire of design types in a design field* *Doing-as: a repertoire of experiments* *Theories-in-use: a proper cooperative attitude, where the designer strives to engage in dialogue rather than "achieve the object as I see it"*

Table 2. A summary of Simon and Schön's view of generic design. Note that Schön believes that most design knowledge is contextual, so that the generic portion covered by the table is only a limited part.

The strengths of exemplary learning in design studies would seem to include serving as an approach to learn design theories and methods of the sort envisaged by Simon. In Simon's proposal for a curriculum of design, the entire curriculum, which Table 2 attempts to summarize in a few lines, consists of theories and methods which are of a generic nature. This view of design lends itself to exemplary learning since the same theories and methods are relevant across design cases and even across diverse design fields. Simon saw his curriculum as a universal and coherent entity of knowledge and method, constituting a scientific essence of design. This allows for cases to mirror essence, resembling what was required by Wagenschein and Negt.

In my view, among the design topics suggested by Simon, perhaps the most valuable is that of structure, i.e., design processes and product hierarchy. This topic covers a language of design processes, which may enable a conversation between designers from different

fields about what it means, for instance, to do iterative design in their various fields (see Simon 1996, p 137).

There may be limits to what can be achieved by exemplary learning with regard to contextual design as viewed by Schön. Schön's description of design situations as messy swamps is not included in table 2 above, because Schön does not provide a generic description, say, a classification of various types of design swamps, and how the designer should approach them. The paper's definition of exemplary learning (see Section 4 above) requires that there is a learning outcome of a general nature; by implication, if a design competency can not be generalized, it cannot be learned by exemplary learning. Working with examples is a key activity in a "practicum" of the sort suggested by Schön, but that would be a different way of learning by example, and so would require its own justification.

There are, however, areas of design that Schön identified as having a generic quality. The most significant are perhaps repertoires of types or patterns in a field of design. These seem to be attainable as learning outcomes in exemplary learning. This is in the sense of learning something relevant in a particular field, not all fields of design.

Perhaps Schön's view merits scepticism about whether students can learn design in one context (e.g., the field of media design) and subsequently apply it in another context (e.g., the field of software design). This in turn may suggest that in a broad design study program that spans several design fields, students should at some early point be encouraged to specialize in a particular design field.

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