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ABSTRACT

The issue of educational design was central in a study conducted at the University of Twente (The Netherlands). The goal was to describe the strategies that well-known designers in various education and training practices use. Twenty-three designers from different educational sectors (textbooks, curricula, educational media, etc.) were interviewed, and relevant project documents from their projects were reviewed. Interview findings were reviewed in light of four major movements in contemporary thinking and their underlying rationales: modernism, pragmatism, critical theory, and postmodernism. Main models of educational design can be related to these movements. In the philosophy of modernism, the planning-by-objectives model of instructional design uses logical reasoning and systematic approaches in an instrumental, or end-means, approach. The prototyping model, related to pragmatism, is useful when the goals of the design process are not clear. The deliberative model of educational design, related to critical theory, emphasizes the function of communication. The final model, the artistic model of educational design, is related to postmodernism and considers those who make decisions about instructional design as artists representing views of reality. Fragments from the interviews are used to illustrate these perspectives, although none of the designers represented the artistic rational. (Contains 2 tables and 21 references.) (SLD)

Design Approaches in Training and Education:

Insights from practice

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1. Introduction

There is a growing number of publications on educational design and development that discuss the relationship between design methodology and design practice. A point of criticism is that there exist many interesting, successful and relevant design practices, but that existing design models are often connected weakly to these practices. Not only in educational practices, also in other social science practices and in technical practices such as engineering, the same kinds of concerns are expressed. To overcome the gap between design methodology and practice, we need studies of successful design practices. This empirical basis can then be used to improve our design models so that they become better connected to practice (see also Tessmer & Wedman, 1995).

This issue is put central in a study that is carried out at the University of Twente, Faculty of Educational Sciences, Department of Curriculum, in the Netherlands[1]. The central goal of this study is to describe the design strategies that high-reputation designers in various education and training practices use. In this study, we have interviewed 23 individual designers from different educational sectors (designers of text books; curriculum developers; designers of educational media; HRDers from internal training departments; external training advisors; designers of distance education) about one specific project they had completed recently. Also, relevant project documents were studied. During the interviews, the designer was asked to specify to what degree the strategies and activities conducted in the specific project reflect his or her general approach. The designer is also asked to discuss how and why (s)he may have deviated from his general approach (for example, by indicating the special circumstances which caused him/her to use alternative approaches). The second interview builds forth on the first, and also relies on questions derived from project documents. The raw interview data are summarized in a report and sent to the interviewee for an intense review. This report is used for further analysis.

The purpose of this paper is twofold:

- to describe and discuss the theoretical framework that is being used for the analysis of the interview data (chapter 2). This framework is based upon a synthesis between educational design literature and contemporary philosophy. We developed this framework while we tried to analyze the data, and noticed that our previous framework was insufficient.
- to describe some preliminary results from the interviews with 23 designers (chapter 3), using this framework. We will show that differences between designers can be explained by the different rationalities they put to the fore.

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[1] This study is part of an Interfaculty Program ('OSF-project') at the University of Twente. The OSF-project is a joint effort of the Faculties of Technology and Management, Public Administration, Philosophy and Social Sciences, and Educational Science and Technology. The general aim of the OSF-project is to contribute to the development of a design methodology for the social sciences. For this purpose, design practices in several social fields are reconstructed, in order to deepen insights in design and to find clues of how existing design methods could become closer connected to practice.

2. Framework for the description and analysis of design practices

To describe and analyze design approaches in practice, a theoretical framework is needed that both reveals relevant similarities between design approaches and at the same time does justice to the differences between them. In the search for such a framework, we found two perspectives in literature of dealing with the heterogeneity of educational design practice.

According to the *generalising perspective*, various design approaches are considered to be different in detail, but essentially the same. The differences are said to be differences in focus, originated by contextual factors and by the distinctive purposes for which the approaches are employed (see eg. Gustafson, 1996). Although we found in our data that the main phases of development (analysis, design and evaluation) occur in all approaches, we found the approaches in itself too distinct to be reduced to one general, and similar approach. Actually, we think that regarding all approaches essentially the same, does injustice to the specific characteristics of each approach and may even be one of the reasons for the perceived gap between these kind of models and practice.

Thus, we are more attracted to the second perspective, the *continuum perspective*, that distinguishes between different models: planning by objectives model, prototyping model, deliberative model; and artistic model. In the continuum perspective, these models are put on a continuum, ranging from a rational systematic extreme (planning by objectives) to a creative, intuitive extreme (artistic model) (see for example Visscher-Voerman & Plomp, 1996; Walker, 1990; Marsh and Willis, 1995). Although the metaphor of a continuum does justice to the specific characteristics of different approaches and gives insights in different ways in which the phases of development can be conducted, it obscures the systematics that is underlying each approach.

In our first attempt to categorise our interview data according to the main models, we realised that distinguishing between a rational and intuitive extreme is insufficient. Rather, it turned out that developers hold different conceptions of what is considered as 'rational'. Also, we found that factors such as time and finances often thwart the sequence of the planned activities (see also Wedman & Tessmer, 1993), and that, therefore, it was sometimes hard to recognize the ideal-type models of educational design in practice. Practical circumstances, either planned or unplanned, intervene with the systematics of the approach and obscure its identity. However, focusing on the underlying rationality of the models enables us to show the essential characteristic of each model, and to analyze the design approaches in practice, acknowledging the day-to-day concerns that designers have to face.

To distinguish between types of rationality, we turn to contemporary philosophy. In the next paragraphs, we will shortly discuss four major movements in contemporary thinking and their underlying rationalities: modernism, pragmatism, critical theory, and post-modernism (2.1). We will then connect the rationalities that are exposed by these different perspectives to the main models in educational design: planning by objectives, prototyping, deliberative approach, and artistic approach (2.2). The framework that thus evolves seems to be useful to name and characterise different approaches in the practice

of educational design, but should be considered as a first elaboration, aimed at opening rather than at closing the discussion.

2.1 Types of rationality in contemporary thinking

Instrumental rationality in modernism

The dominant paradigm in western scientific thought is modernism. In modern thinking it is assumed that by following the strict rules of the exact sciences, truth can be discovered. Descartes is considered as the father of modernism; he introduced the modern, independent subject that -by thinking rationally- can reveal the evident truths of reality, which is knowable and objective. In 'Discours de la Methode' Descartes formulated four basic rules for a scientific method:

- *accept nothing as true which one does not clearly recognizes it to be so;*
- *reduce problems step by step into those that are simpler (method of analysis);*
- *start with the (intuitive) simplest proposition and move to more complex one (synthesis or composition)*
- *make enumerations as complete as possible.*

According to Descartes, empirical experiments can support the discovery of facts, but the emphasis is on logical reasoning.

Early versions of modernism, like Descartes', hold a strong objectivistic conception of reality and knowledge. In contemporary theories of modernism this is often replaced by more contextual and intersubjective notions. The scientific method however, stays more or less the same: starting from theory, hypotheses are formulated that might solve the problem at hand. By a thorough study the alternatives are weighted. This leads to the knowledge necessary to decide upon the best solution. If possible, empirical experiments are conducted for verification.

Because in modernism the end (solving the problem) is defined independently from and prior to the means (the way to solve the problem), this type of reasoning is called end-means rationality. However, a lot of other formulations are used, depending on its appreciation. Whereas proponents of modernism prefer the concept of scientific rationality, critics often use the concept of 'technical rationality'. Neutral equivalents are: instrumental, functionalistic, and procedural rationality.

Notwithstanding its dominance (or, as one could argue: due to its dominance), modernism has been a target for all kinds of critiques. In general, the criticism was, and still is, directed towards the one-sidedness of the technical perspective, the supposed objectivity of the scientific researcher, and the haughty assumption of progression of humankind. But although the critique often is similar, the consequences that are drawn from it are not. This is shown by the major three movements that criticise the modernist perception of reality and truth: pragmatism, critical theory and post-modernism.

Practical rationality in pragmatism

At the end of the nineteenth century, the sciences were strongly influenced by a new epistemological perspective, called pragmatism. In pragmatism, the modernist notion of a knowable, objective reality is not only criticised but also found irrelevant. In fact, the pragmatist rejects such notions, arguing that we should primarily be concerned with practical instead of theoretical issues. The pragmatist refuses to participate in the ongoing dispute on epistemological assumptions between the modernists and their critics. "We might all see the world differently, but we also have to deal with the very same world. So what does an epistemological perspective really matter?", he would argue. The pragmatist calls a statement true when it works, when it is useful. In its most extreme form, this perspective leads to statements such as:

> *If the hypothesis of God works satisfactory [...] it is true (James, 1907, p. 299).*

Famous pragmatists are William James and, well-known in educational sciences, John Dewey (1938). Both scientists gave priority to experimental instead of theoretical reasoning. Therefore, we will refer to this type of rationality as practical rationality.

Recently pragmatism has revived by scientists such as Hilary Putnam and Richard Rorty (1979, 1991). Putnam, who originates from the exact sciences, claims that the idea of a coherent theory arrived at by the scientific method' is chimerical (Putnam, 1988).

Rorty's main influence is on the social sciences and social philosophy. He is of the opinion that we can never justify the assumptions of our theories. This, rather relativistic, epistemological position implies that an ultimate foundation of knowledge is impossible, that truth is non-existent.

Communicative rationality in critical theory

In the first decades of this century, a marxistic-oriented scientific movement arose, called critical theory. This movement strongly objects towards the still dominant type of technical reasoning advocated by the modernists. According to the critical theorist, one cannot always consider means independent from ends. How to argue about ethical issues for example, in a technical manner where personal values play no role? The critical theorist argues that truth is not as decontextualized as the modernist would like to believe; people always make sense of the world together. The scientists have to be aware that their knowledge is never neutral. Marcuse puts it as follows:

> "*Was jeweils gegeben ist, hangt nicht allein von der Natur ab, sondern auch davon, was der Mensch uber sie vermag*".

Jurgen Habermas, the most well-known present representative of critical theory, has introduced the concept of communicative rationality. Communicative rationality does not aim at discovering truth but aims at reaching consensus. Habermas argues that whereas instrumental rationality might be useful to solve a technical problem, communicative rationality should be used when people are involved. The critical theorist does not deny the possibility of truth but sees truth as an intersubjective notion that we define by continuous communication. For this communication to be just, everyone concerned

should be able to participate. Communication therefore, has a strong legitimising function.

Artistic rationality in post-modernism

A fairly new movement in contemporary thinking is post-modernism. Post-modernism can be characterised with the keyword 'difference'. The post-modernist is of the opinion that western scientific thought is flawed with its emphasis on sameness. By trying to discover the ultimate theory and the one-and-only truth, the sciences reduce reality to one view and truth to one foundation. The post-modernist will never stop pointing at the underlying assumptions of established scientific methods. In his opinion, scientific thought has inherited the dichotomous thinking of the cartesian ego, that only allowed the mind, and not the body, in the sciences. Why mind and no body, why rationality and no creativity, why singularity and no plurality, why abstract and not concrete, why thinking and no feeling, etcetera, etcetera. The modernist perceives them as opposites, the post-modernist thinks they are not.

A well-known post-modern strategy is deconstruction, introduced by Jacques Derrida. Deconstructivism originates from literature criticism and denies the existence of one meaning of a text. Instead of focusing on the explicit message of a text, the deconstructivist focuses on its hidden assumptions. By uncovering the things not said, meaning is constantly changed. Because the post-modernist tries to dissolve the borders between the domains of the sciences and the arts, we will refer to their type of rationality as artistic rationality.

2.2 Models of curriculum development

In the previous, very general, discussion of major movements in contemporary thinking, we have distinguished four types of rationality: technical, communicative, practical, and artistic rationality. In this section, we will describe the main models of educational design and relate them to the four rationalities (as summarized in table 1). By using these rationalities, it will be possible to formulate the distinctive characteristics of these main approaches. For each approach, quotations from one or two designers will be used to illustrate how developers often implicitly refer to their rationality. In chapter three, the interview data will be described in more detail. ↳(in 3.1)

Model	Rationality	Philosophical tradition
PBO model	instrumental	Modernism
Prototyping model	practical	Pragmatism
Deliberative model	communicative	Critical Theory
Artistic model	artistic	Post-modernism

Table 1: Models for educational design and their underlying rationality.

Planning by objectives model (PBO) and instrumental rationality

The majority of curriculum and instruction models in the literature can be characterized as a form of planning by objectives. As the term indicates, the formulation of objectives is central in the models. According to these models, in an early stage of the development process, time is devoted to give concrete form to the intended outcome of the project, formulated in terms of project goals and learning objectives. Next, the means are determined that are necessary to reach these concrete goals and objectives. The way in which the means are selected, depends upon the specific project.

Sometimes a detailed task analysis is needed, for example, in case of a new industrial training. In other cases, a small investigation is sufficient. After the selection of the means, the development process can start. This implies that most of the design decisions have been made before the actual development starts. The list of objectives that has been formulated functions as a guide throughout the whole process of development. By checking this list continuously, it is possible to prevent deviations from the objectives to occur.

This strategy resembles the scientific method that is advocated by the modernists. Logical reasoning and systematically working are considered to be essential elements to guarantee that the best solution is reached. That the emphasis is on instrumental, or technical reasoning actually needs little argumentation, since this is exclaimed both by proponents and opponents of planning by objectives models. Famous examples of developers of this approach are Bobbitt (who was of the opinion that curriculum objectives have to be formulated in explicit activities, because the educationists needs to know with certainty at what they are aiming (Bobbitt, 1924, p. 24)) and Tyler whose work 'Basic Principles of Curriculum and Instruction' made this systematic approach world-wide known. His work is often referred to as the Tyler Rationale; it offers a rationale, a logical ground, for curriculum development. The Tyler rationale addresses four basic questions (Tyler, 1949, p.1-2):

- What educational purposes should the school seek to attain?
- What educational experiences can be provided that are likely to attain these purposes?
- How can these educational experiences be effectively organised?
- How can we determine whether these purposes are being attained?

The Tyler Rationale shows clearly the underlying instrumental rationality: the ends are defined first, and the means are dealt with separately.

In an instrumental or end-means rationality, the formulation and specification of ends is the first and most essential step. Therefore, in an approach advocating this type of rationality, the emphasis will be on the phase of preliminary investigation. This is not to say that most of the time is devoted to this phase, it is the weight that is attached to it. For example, one of the designers indicated that the first phase of project definition and specification is the most important phase, because the creative design decisions are taken there. In the following phases of design and construction, the plans are developed in more detail, but these are less creative phases than the first one.

Prototyping model and practical rationality

The prototyping approach originally comes from the field of software development. Thus, this approach is especially useful in the field of educational software, or -in a broader perspective- in the field of electronic learning materials (Moonen, 1996). But it is not unthinkable that this approach can also be very useful in fields where computers do not play a major role (as will be illustrated by the interview data).

In the prototyping approach, the practical environment is put central. Based upon a short problem and context analysis, a preliminary version of the eventual product is developed. This preliminary version is evaluated with the users, after which new decisions about the product and the development process can be made. Depending on available time and finances, this process is repeated several times. The main reason for using a prototyping approach is the idea that the best way to test the value of a product and its functionality is with the users. By testing in practice, implementation failures and systems problems will become clear.

By putting much emphasis on the users and the practice in which the product is to be used, the practical rationality underlying this approach becomes clear. There is a straight resemblance to the way of thinking by the pragmatists for they argue that things are true when they work and when they are useful. To judge this, the multiple perspectives of the users are needed to judge an educational product as 'true' and useful.

There are two ways of prototyping: (1) incrementally, where small parts of the design product are designed in succession and evaluation data of a first part guides the development of a second part; and (2) evolutionary, where the total product is developed on a global level, and specified during the process, based on in-between evaluations. In some cases, designers make use of throw-away prototypes. These prototypes serve to explore the consequences and/or possibilities of certain design decisions. The prototypes are thrown away after the practice test.

Prototyping models are supposed to be useful when the goals of the design process are unclear; for example, in cases of a new product, or a new context, or when clients are unable to formulate exact wishes.

Deliberative model and communicative rationality

In the deliberative approach of educational design, the emphasis is on the realisation of decisions. This approach is developed by Walker (1990), and is characterised by him as follows:

> *"In the broad outline, the process is one of formulating a platform of ideas, using these ideas to conceptualise the problem and to generate promising versions of materials, assessing the merits of promising early versions, and revising them until they cannot be improved further" (Walker, 1990, p. 472).*

First, the developers formulate a platform of ideas. This platform consists of all relevant subjects known to the developers, such as a definition of the problem, the material constraints, fundamental didactic or psychological premises, and a tentative concept of the

product and the procedure. Whether these first ideas are correct, is verified by analysing already existing materials or observing real classroom situations. Based on the platform, decisions are made for development activities. These activities induce a further refinement of the platform of ideas, for example to adjustment of an opinion or the elaboration of a certain perspective. The product comes into being in a continuing dialectic between the platform and the development activities. In this manner, the practical knowledge and the experiences of the developers function as starting point for the development.

The deliberative approach is rooted in the naturalistic approach of Schwab. Schwab responded to the uniformity of development procedures as proposed by systematics such as Tyler. According to Schwab, curricular decisions are too complex to be solved by a simple heuristic. This criticism corresponds to the critique of the critical theorists that social actions cannot be understood by sheer instrumental reasoning. Schwab views the development of a curriculum as a process of 'trial and error': ideas are collected, partly elaborated, and, depending upon their coherence, used as an example or a counter example in the further development of the product. This is a process of continuous deliberation of means and ends, of possibilities and alternatives (Schwab, 1970).

Deliberation is an intersubjective social activity between all those involved in the process (see in this respect also the work of Kessels, 1993). Therefore, the communication between developers, clients and the users of the product, functions just as in the critical theory as a legitimising factor. To be able to make decisions based upon this communication, striving for consensus is essential. Furthermore, Walker is just as Habermas of the opinion that certain rules must be followed to guarantee that the process of deliberation is a fair process:

> *"Those who would master the arts of deliberation must develop sensitivity to the moral and legal rights and obligations of all affected by a decision and learn to arrange deliberation in ways that consider the particular human and institutional context without undue threat to those involved" (Walker, 1990, p. 201).*

The emphasis on a shared framework and on the legitimising function of communication, shows the communicative rationality that is underlying the deliberative approach. The central point in a deliberative approach of educational design is to reach consensus between all actors involved.

Artistic model and artistic rationality

The artistic approach of educational design is reflected in the work of Eisner (1979). Eisner portrays social reality as negotiated, subjective, constructed, and multiple: he maintains that there are many ways in which individuals construct meaning. He considers each person who makes decisions about curricula or educational products as very much like an artist choosing among an almost limitless variety of ways of representing his or her view of reality (Marsh & Willis, 1995). Eisner suggests that "the process [of curriculum planning] is far more convoluted, circuitous, and adventitious, than one might be led to believe by reading the literature (Eisner, 1979, p. 116).

Eisner believes that evaluation is fundamentally the same natural process in which people constantly engage in attempting to make sense of the world around them and of their own lives. This kind of public portrayal of valuing and reasoning is part of formal evaluation, but even in its absence, evaluation is always going on informally. In this respect, the work of Schön (1983) very much resembles Eisner's way of thinking. Applied to education, these skills are called educational connoisseurship, which he defines as:

> *"The art of appreciating what is educationally significant. It is a means through which the shape of the context and the configurations within it can be recognized so that intelligent decisions about that context can be made."*

According to Eisner, curriculum development is *"both a practical and an artistic undertaking; it requires prudence, wisdom, and practical insight into the realities of elementary and secondary school classrooms. It also requires a sens of taste, design, and fitness. The parts must all hang together. They need to make sense, they have to be aesthetic". (p. xi).*

Eisner argues that the skills of an educational designer are very much artistic: although they can be learned and heightened through practice and experience, they cannot be reduced to a specific method. He demands that many of the most important decisions about the curriculum be made in the classroom by the teacher who enacts it and who observes how students experience it.

Eisner's remarks about educational design adhere to the artistic rationality as described by the post-modernists. Just as post-modernists, Eisner criticises the instrumental rationality as depicted in Tyler's work. Eisner's' sense of the 'null-curriculum' reflects the ideas behind 'deconstruction'.

3. Training and education design practice: some results

In this paragraph, we intend to provide the reader with some insights from practice. First we will present some interview fragments to illustrate the different rationalities (3.1). Then, we will give an overview of the rationalities we found in the several sectors (3.2). In the last paragraph, we will focus on some designerly topics and describe how designers with different rationalities deal with these topics differently. Again, we will use some interview fragments as illustration (3.3).

3.1 Practical illustrations of the four rationalities

In this paragraph, we present some interview fragments, to illustrate how the rationalities get shape in practice.

An example of instrumental rationality

The main elements of the approach of a designer of educational media (VCR programs) are:

- having the client specify as early as possible what his needs and wishes are, so that she can use that as a target.
- working with half products so that she can show the client she is working on the problem and can check whether she is reaching the specified quality demands.

She reflects on her approach:

> *"I want to reach effects and that is why I try to get clear in the beginning what the client wants, because that means that I can reach my goal straight away. I am not blinkered: I know that there are many roads leading to Rome, and I don't mind choosing one road above another, but once the client has chosen a road, I want them to stay there."*

Somewhere else in the interview she tells that she would perceive it problematically if ideas about the product that are specified in the beginning would change during the project:

> *"That would mean that I did my analysis poorly. I would think I did not use my checklist well, that I listened poorly.*

Examples of practical rationality

While talking about an educational simulation program, a designer explained:

> *"You have to work with prototypes. This is necessary because one cannot define everything in advance. The technology changes fastly and you often know too little about the client and the users to know exactly what the product should look like, based on verbal discussions with them. The use of prototypes enables us to clear up the specifications. Design decisions are mingled and one can only think over design decisions, and decide whether they are useful, once they have been realised and put to work."*

According to another designer of text books, a prototyping approach is really important to decrease the distance between what seems theoretically useful and practicably feasible.

> *"Our curriculum started scientifically: we adhered to theories about differentiation in learning. You can be dazzled by a theory that prescribes exactly how to do it. Practice will often show that the theory needs to be adjusted, because the theory does not fit to practice, because the ideals are farther ahead than is practicably feasible. One needs to test the gap between theory and practice and that is why we test all our products several times in practice ..... By testing in practice, we are enabled to correct the mistakes we made in the book, thereby enlarging the user value of the book."*

Examples of communicative rationality

An external training advisor reflects upon his approach as follows:

> *"I plan to put more energy in the relation with the client than in the product, because I think that will increase the value of the intended curriculum more than when you put a lot of energy in the formal curriculum, the product. The internal consistency of the product can be high, but when you neglect to work on the*

acceptation of the product, than the chance is small that there will be a high learning effect. When you have discussed the product with the actors involved, the perceived curriculum in their heads will be clear, which is as important for the intended curriculum ..... It is very important that you make a product that is internally consistent, but it is more important to create support. Actors should have the feeling that it is their product. When they ask you to make a product, it is very important to change that view towards a view of shared responsibility."

Another designer of text books explains that he works according to a "Product-market concept". According to this concept, an important role is acknowledged for all actors such as content specialists, stylers, persons from the market (teachers), information services. Especially schools and teachers are committed to the process in an early stage to increase the change on a saleable product. He argues as follows:

"It may not happen that we make a perfect product, that does not sell. That's why we deal with wishes of the client from the beginning of the project. For example, we talk with teachers about 'old' methods, we ask them advice about our ideas, we ask people from information services about what people from the market want, etc. ..... User quality is a criterion that is hard to operationalize. It can only be reached if you contact your user constantly and discuss with him what he needs."

No examples of artistic rationality

Among the 23 interviewed designers, we could not find some-one with a clear artistic rationality. There are a few possible explanations.

- it could be that there are no or only few designers with an artistic rationality, and that they were not in the group of people we interviewed;
- we may not understand the essence of the artistic rationality yet, which has blurred our search in the data;
- according to Eisner, designers, but especially teachers are the ones who make creative decisions about a curriculum. We did not interview teachers, and may thus have decreased the change of finding some-one with an artistic rationality;
- it could be that the interview scheme did not allow us to find artistic views, for example because the questions were too 'instrumental'.

3.2 Overview of rationalities in design practice

In table 2, an overview is given of the rationalities which the 23 designers put forward. For internal identification and for external unrecognizability, each designer has been assigned a number. We should emphasize that this overview is based upon rich descriptions about just one specific project per designer. Although we have information from almost all designers that the strategies and activities conducted in the specific project more or less reflect his or her general approach, we want to emphasize that our assessment of their rationality is based upon this specific project.

The assessment of rationalities turned out to be rather easy. We (authors of this paper) both tried to link a designer to a rationality and checked later whether we agreed with each other. We agreed on each of them, but had difficulty with two persons, because the

interview report did not allow us to draw unambiguous conclusions. We then turned to the interview data and came to a considered agreement. We intend to go back to the interviewees to ask them whether or not they agree with it, but were not able to do so at the moment we wrote this paper.

Sector	Nr.	Rationality	Method
Designers of text books	1	instrumental	pbo
	2	communicative	deliberative
	3	communicative	deliberative
	4	practical	prototyping
Curriculum developers	5	instrumental	pbo
	6	communicative	deliberative
	7	communicative	deliberative
	8	instrumental	pbo
Designers of educational media	9	practical °	prototyping
	10	practical	prototyping
	11	instrumental	pbo
	12	instrumental	pbo
HRDers from internal training depts.	13	instrumental	pbo
	14	instrumental	pbo
	15	instrumental	pbo
	16	instrumental	pbo
External training advisors	17	communicative	deliberative
	18	communicative	deliberative
	19	communicative	deliberative
	----	----------	----------
Designers of distance education	20	instrumental	pbo
	21	instrumental	pbo
	22	instrumental	pbo
	23	instrumental	pbo

Table 2: overview of rationalities in different sectors.

When we look at the data, we see three sectors in which all designers adhere to the same rationality and three sectors in which different rationalities exist. Although it is tempting to look for explanations, we will neglect them in this paper. Instead, will we will look at some striking differences between designers and see how these differences can be explained by the different rationalities they put to the fore.

3.3 Designer differences related to different rationalities

We have mentioned earlier that there are many factors in practice that have a constraining influence on the design process. One could think of factors such as restricted availability of time, money, resources, etc. Also the complexity of the design task itself and the uncertainty of the situation -f.e. when many actors are involved, when design goals are unclear, etc.- influence the way in which designers do their job. A comparison of the data shows that designers with different rationalities tackle these factors in different ways; that they have their own ways of dealing with constraining factors. We will reveal some of the differences by relating them to two issues that are put forward in design literature:

- Dealing with early solution ideas. For example, Rowland (1993) and Schön (1983) observe that designers often have a tentative view of a possible solution early in the project. What do designers do with this solution idea? How do they relate it to the problem they have to solve? How does it influence the way in which they work?
- Shaping the project. There are many publications which acknowledge the fact that designers work in situations that are unstable, unique, and complex (f.e. Schön, 1983). When the future is unpredictable and when it is hard to formulate specific goals at the beginning of a project, what do designers do to create a space in which they can work? How do they shape their project?

Dealing with early solution ideas

Several interviewees confirmed that, at the start of the project, they often already have a rather clear idea of a possible solution. That is, they often view clearly what kind of product needs to be made, and they also see can indicate what its content should be.

For designers with an instrumental rationality, having an early solution idea is perceived as a restraint: they warn that one takes the risk of following that specific solution which may be less suitable for the problem than other unexplored options. They also fear that -during the process- it may become clear what a better solution could have been, but that it may be too late, to change things. An internal designer explains how he deals with this issue:

> "*.....Before you can make a good choice for a solution, you should have followed certain steps (determine what the job description is, what knowledge people need, what education is already available, what alternatives are possible). Before you finally choose a solution, you should deliberately reflect upon the process and determine whether these steps have been undertaken.*"

Whereas instrumental designers return to the problem and make sure that they have asked some analysis questions before they choose a solution, practical designers reported that it is never too early to get an idea. They have experienced that the best way to get problem specifications clear, is to provide the client with ideas. Often, this is done in the format of a concrete product (first prototype). Two of the practical designers did warn, however, that it is important to think over what the consequences of your solution will be for the client and its users.

It is important for communicative designers that the solution to be chosen is one of the client and actors involved. One of the external advisors reported that, therefore, he tries to leave the problem statement and solution ideas open as long as possible:

> "*.....It is essential that one should not immediately explore the tentative solution. By leaving the choice for a solution open in the beginning, the client is enabled to elaborate on the problem and possible solutions. In this way, the problem and the solution are shaped during the process. By having the client formulate the final solution, his commitment is increased, and thereby the chance that the solution will be used and will be useful.*

Several designers from different rationalities explained that it can be very useful to show the design team, client, or other actors examples of previously designed products for

similar kinds of design problems. This will give them an idea of possible solutions and will help them specify what they want. Again, instrumental designers warn that -although it can be useful- the client may be guided by the examples too much, and become ignorant of other solution possibilities.

Shaping the project

One of the characteristics of design is that it is often difficult to formulate clear goals at the beginning of the project. Also designers with an instrumental rationality who claim that goals must be specified before one can start to design, do acknowledge this. For example, it often occurs that clients cannot formulate their specific wishes at the beginning of the project, just because they are not familiar with the kinds of solutions you are able to provide. It can also happen -especially in case of long-term projects- that national or local policy has not been specified at the beginning of the project. It is interesting to see that designers with different rationalities deal with this uncertainty in different ways.

An instrumental designer of text books explains that text book design takes several years. Although the content of the text books should prepare students for national exams, the exams and policy about exams are not formulated at the moment the project starts. He 'solves' this problem by deliberately creating artificial boundaries:

> "..... *I calculate and estimate what the situation and demands/requirements will be at the moment the book is to be published. I for example try to estimate what kinds of topics will be in the exams. I then use this estimate as if it were the real demands and requirements. Starting from these boundaries, I then can specify the content and organisation of the product and the design process. I think of design as taking a calculated risk*".

According to a communicative designer, the creation of boundaries at the beginning of the project would create false certainty. He argues that it is better to keep the project open in the beginning, and to create an atmosphere in which the problem can be explored and tackled by the actors. Accordingly, solution specifications will become clear during the project. The designer could facilitate the process of solution specification by asking good questions and by providing his ideas.

A designer of educational simulation, who showed a practical rationality also acknowledged that it is often not possible to define clearly what the final product should look like at the beginning of the process, because of uncertainty about technical and/or functional aspects. He argues that the use of prototypes helps to get matters clear. He states that it is one of the most important tasks of the designer to identify these uncertainties in the beginning, as well as possible pitfalls and explore these by means of prototypes. After the design and evaluation of each prototype part of the uncertainty should be reduced.

We see that designers with different rationalities have different tactics. The instrumental designer creates artificial boundaries, the communicative designer lets uncertainty exist and overcomes this by discussion with clients and actors. The practical designers clears up uncertainty by testing prototypes with users.

These three (and other) designers also explained that it might be very helpful to split the project up into different parts, where the first part of the project can be used for further investigation of the situation. According to the instrumental designer, this will lead to better insight in the project goals and the ways they will be reached. For the communicative designer, the most important profit of this way of working is that it enables different parties to establish mutual trust. This will make them feel more committed to bring the project to a successful ending. The practical designer clarified that he will only invest time in this pre-project phase to get specifications clear, when the client promises him that he will get the project.

4. Conclusive remarks

In this paragraph, we will discuss the worth and value of this theoretical framework for describing, analyzing and interpreting design practice.

First, by using a rationality perspective, we learn to value each approach per se, and to focus on its specific quality, rather than to judge one of them at the expense of another. In literature, for example, new ideas or models are often presented by reacting against supposed weaknesses of instrumental approaches. We think that this wrongs the specific value of the instrumental approach. By focusing upon underlying rationalities, we are enabled to value each approach in itself.

Second, the main models of educational design are in itself ideal-typical and will never appear as such in reality, because factors such as time and finances often thwart the sequence of the planned activities (this holds especially for planning-by-objectives models). When practical circumstances intervene, theoretical distinctions merge. By characterizing the underlying rationale of the models, the essence of each of the models becomes clear, which enables us to judge approaches in practice on their pragmatic value, rather than to see them as weak or bad elaborations of the ideal-typical models.

Third, by describing the models according to their rationality, rather than putting them on a continuum, the description of design-related factors becomes less forced and artificial. For example, we used to think that formative evaluation is more important in prototyping approaches than in planning-by-objectives approaches, or that planning-by-objectives approaches are more systematic than deliberative approaches. By using our framework, we realized that each model has an underlying system and that formative evaluation can play a major role in each model. Only the purpose and the questions to be answered may be basically different. Also, some of the results presented in 3.3 show that the ways in which designers deal with situations are *basically* different, rather than more or less the same. This framework thus helps us to get a refined and differentiated view of design.

What to do next? In a previous paper (Visscher-Voerman, 1995) we stated that factors in the design situation determine the way in which designers work. We mentioned factors such as professional background and experience of the designer, relationship with the client, size of the design team, the level of design, format and function of materials, availability of support tools, site-specific versus generic design; complexity of the project,

nature of the sector. A next interesting step is to describe and analyze our data in such a way that it becomes clear what factors co-exist with what rationalities, and to find possible explanations for this co-existence.

Insights in which situations and under which conditions certain rationalities and approaches work, may help a designer with a specific rationality to create the exact and right boundaries for his approach. To illustrate this: one of the interviewees who worked according to the practical rationality and used a prototyping approach tested -on request of the client- all his prototypes with the client and not with the users. When he finally asked the users to evaluate the last prototype, he felt forced to change his prototype largely, which cost him a lot of time and money. Had he been aware of his rationality, he might have claimed to test his prototypes with the users. We think that when designers are aware of their rationality, they will be better able to create the right boundaries and settings for their approach. In some cases, where these boundaries cannot be shaped, the designer may feel legitimized to stop the project. However, a more effective strategy would be to change rationality (just like a chameleon changes color (see also Visscher, 1996)). If designers have insights in rationalities and approaches, they may be better able to do that. Thus, they will become better equipped for all ranges of design situations, which will increase the chance that they will finish more projects successfully.

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