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Didaktik/fachdidaktik
as integrative transformation science(-s) –
a science/sciences of/for the teaching profession?

Abstract

Most conceptions of professionalism (e.g. functionalist, system-theoretical, structuralist) stress the relevance of the existence of (a) corresponding, well developed science(-s) and of (scientifically) validated practices for a particular (academic) profession. The fulfilment of these criteria has remained an open question for the teaching profession, although much (scientific) knowledge and some (scientifically) validated practices relevant for teaching and learning in schools and the teaching profession have been developed. This knowledge has mainly been produced by Erziehungswissenschaften (“educational sciences”) and its subdisciplines (e.g. Didaktik, educational psychology) as well as by various Fachdidaktiken (“subject-related didactics”) for different subjects taught at schools. Questions will be raised about the status of different types of knowledge produced and their relevance both for teacher education (TE) and the teaching profession. A (preliminary) model of “Didaktik/Fachdidaktik” (DF) as an integrative transformation science dealing with teaching/studying/learning will be presented. The potential of DF to become a science/sciences of/for the teaching profession and some measures perceived to be necessary to approach it will be discussed.

Preliminary remarks

As a concrete outcome of an all-European and European Commission supported project (Sigma) on the evaluation and perspectives of a number of higher education studies the European Commission has established so-called thematic networks within the Socrates programme. The report on the evaluation and perspectives of TE in the Member States of the European Economic Area has been submitted by T. Sander *et al.* in 1996. Established in 1996 the Thematic Network on Teacher Education in Europe (TNTEE) may be seen as a large network dealing with core problems of TE in a number of subnetworks. These subnetworks may be understood as meeting places for teacher educators and researchers aiming at improvements of TE both theoretically and in concrete all-European projects.

One subnetwork of TNTEE (subnetwork E: Didaktik/Fachdidaktik as science(-s) of the teaching profession?) focusses on the role of Didaktik (“didactics”) and Fachdidaktik(-en) (“subject-related didactics”) and their potential to contribute to the improvement of the quality of teaching/learning

both at schools and in TE. Additionally, this subnetwork explores the potential of Didaktik/Fachdidaktik to become a science for the teaching profession. So far, this subnetwork, consisting of experts from different academic disciplines and coming from 11 European Economic Area Member States, has published a heterogeneous collection of more than 20 publications on its topic. This chapter may be seen in relationship to ongoing work of the subnetwork mentioned. It is both a modified and enlarged version of the publications “Scientific bases of initial teacher education and their relevance to evaluate it – between the state of practice and the state of the art” (Buchberger 1998c) and “Didaktik/Fachdidaktik as science(-s) of the teaching profession?” (Buchberger and Buchberger 1998).

Introduction

Ironically, one might state that education and training have increasingly become big super-markets. Education policy – as well as social policy – and economic policy documents unanimously stress the necessity of human resource development and of high quality education and training for all (cf. European Commission 1995, 1997, OECD 1996, 1998). It is argued that the prosperity of post-industrial information and knowledge driven societies would depend on the optimal development (and exploitation) of the human capital of all its citizens and that these societies had “*to transform themselves into dynamic learning societies*” (OECD 1996). Substantial reforms of education and training are perceived to be indispensable. Focussing on traditional “*more of the same – rationales*” (modification – and adaptation strategies) to improve or to make education and training more efficient is perceived as inappropriate (OECD 1996) considering the amount of problems persisting and the rapidly changed/changing contexts (e.g. “globalization”, cf. Amin 1997, Beck 1997) and conditions (e.g. the multimedia revolution, cf. Tella 1998) of and expectations of education and training.

Policy documents frequently stress the important role education and training establishments, teachers and their education had to play to meet these challenges adequately and to realize education and training reforms perceived to be necessary. H. Judge (1998, vii) has described the status quo of education reform and the role of teacher education (TE) in the United States in his foreword to the evaluation report on the Holmes Commission/Partnership activities (cf. Fullan *et al.* 1998) as follows: “*The most salient change since 1986 has without doubt been the installation of teacher education reform at or near the head of every agenda for educational regeneration: a hitherto neglected or subordinate theme has become dominant. Just as it has emerged as a commonplace that reform cannot be achieved without good teachers, so it has become axiomatic that good teachers need and deserve a first-class preparation*”. But, at the same time J. Sikula (1996) has stated in his introduction to the second edition of the “Handbook of Research on Teacher Education” that schooling and teacher preparation have not been high priority issues in American education policy yet.¹

Parallel with developments in the United States, policy documents of the European Commission stress the importance of high quality education and training for all and the role teachers and TE ought to play. “Quality”² of education and training in general and of TE in particular had to be improved. Reforms of TE perceived to be indispensable had to relate to aims and objectives, contents and learning areas, teaching/learning strategies and learning environments as well as to administration and governance issues. However, coherent action cannot always be detected – both at European Commission level and at the level of the different Member States of the European Union. Despite rhetorical agreement on education and training reform in general and TE reform in particular being indispensable for education reform, neither rank top on the political agenda of the European Commission nor on those of most of its Member States (cf. Buchberger 1998a, b).

However, there seems to exist broad agreement on the relevance and importance of the best education possible making use of the best knowledge available. This calls for coherent efforts to produce scientifically validated knowledge and practice. Efforts to produce scientifically validated knowledge and practice neither contradict, nor do these imply a devaluation of, the relevance of other types of knowledge relevant to education (e.g. tacit knowledge of education practitioners). As both models of (simple) applications of explanatory knowledge (“theories”) and of knowledge transfer have proved to be rather inadequate (cf. Radtke 1996), problems of different types of knowledge and their relevance for (professional) educators as well as of knowledge transformation have found more attention – a new challenge for TE and educational research? In every case it seems to be necessary to professionalize³ (teacher) education by adopting scientifically validated knowledge and practices in approximating the best education possible. Most conceptions of professionalism (cf. Combe, Helsper 1996) include as one defining concept the existence of a well-developed science of/for a particular profession. If teaching is to be understood as a profession, it needs clarification as to which science it is and how well this science is already developed.⁴

(Comparative) Research on TE and its reform (a rather poorly developed field in most Member States of the European Union) has highlighted both a large number of (persisting) problems of TE (e.g. problems with theories of TE as well as methodologies adopted in TE, problems with a research-based knowledge base of/for the teaching profession or with appropriate teaching/learning strategies) and a (sometimes rich) potential to improve it (cf. Sander *et al.* 1996) – sometimes with big differences between the different Member States of the European Union.

Against this background this article will mainly deal with the scientific knowledge bases of TE. It will focus on the role of “Didaktik/Fachdidaktik” (DF) as a possible science for the teaching profession.

Without going into detail some remarks on terminology should be made in advance:

- (i) The concept of science (Wissenschaft) will be used in a rather liberal form following meanings attached to it in continental European cultural contexts. It will not be restricted to “natural sciences”.
- (ii) The concepts Didaktik as well as Fachdidaktik(-en) (literally translated as “didactics” and “subject-related didactics”) are closely related to the German Geisteswissenschaftliche Paedagogik and the concept of Bildung (cf. Kron 1994, Seel 1999). This fact may be considered in relation to problems of intercultural (mis-) understanding.⁵
- (iii) Both the (double) notion of Didaktik/Fachdidaktik and the singular/plural with science(-s) reflect uncertainties and may be interpreted as unsolved problems.⁶

In a general form DF will be defined as (a) science(-s) of teaching and learning (in a learning formation/places currently called “schools”). It will be conceived as a transformation science dealing integratively with:

- (i) contexts of teaching, studying and learning
- (ii) aims and objectives of teaching, studying and learning
- (iii) contents of teaching, studying and learning
- (iv) teaching and learning strategies
- (v) media and teaching/studying/learning aids
- (vi) evaluation of teaching, studying and learning
- (vii) actions of actors involved in the teaching/studying/learning process

While there seems to exist some broader agreement on the topic of DF as a science (of teaching and learning) and to a smaller extent on the seven areas mentioned, the notions “transformation science” and “integratively” will be elaborated on in this article.

As a science DF aims at the production of

- descriptive knowledge/theories (Beschreibungswissen)
- explanatory knowledge/theories (Erklärungswissen), and
- efficiency-oriented knowledge/technological theories (knowledge and measures to provide opportunities for change) (Veraenderungswissen)

In producing Veraenderungswissen DF may be seen as a “design science”. While research on teaching and learning has focussed on the production of descriptive and explanatory knowledge, the production of technological theories for teaching/studying/learning may be seen as a blind spot (and some education researchers even doubt whether in education technological theories may be possible, cf. Alisch 1995).

This article does not provide answers or solutions. It aims at the definition of some main elements of the problem-space. The space available does not permit much detail and this may lead to some misunderstanding, considering the very different background knowledge accumulated in the different cultural contexts of the European Union (compare, for example, the different problem-definitions in England, Finland or Germany). Additionally, this article has to be restricted to some main components of initial TE (ITE), although the authors are very well aware that TE has to be conceived as a continuum and that in dealing with ITE one must always consider conceptions of the (professional) role of teachers and their professional development (cf. Buchberger 1994, 1996; Oelkers 1997).

Within this framework six statements will be discussed in section I and some measures will be described which might contribute to the development of a science of/for the teaching profession (section II).

I

Between the “state of practice” and the “state of the art”

Six statements will be presented to outline the recent situation of ITE (1–4), to describe a concept of DF as integrative transformation science (5) and to define some requirements to develop it (6). These six statements are as follows:

- (1) Teaching and ITE have to be oriented on the “state of the art”
- (2) The “state of practice” of ITE may be characterized as somewhat problematic
- (3) (Research-based) Knowledge bases for teaching and ITE do exist, but are used to a limited extent only
- (4) More research on teaching and ITE is indispensable to increase the scientific bases on teaching and ITE both in quantity and quality
- (5) DF conceived as an integrative transformation science might have the potential to become the main science of/for the teaching profession
- (6) Producing and adopting scientific knowledge bases to improve teaching/learning and ITE calls for co-operative problem-solving processes of all the actors involved

Teaching and ITE have to be oriented on the “state of the art”

This first statement will be introduced by a fascinating court case from the 1930s in the United States, involving the T.J. Hooper, a tugboat. This court case has been described in the preface to the AACTE publication “Knowledge Base for the Beginning Teacher” (cf. Gardner 1989):

“The T.J. Hooper and the ship it was guiding got into trouble in the Atlantic Ocean when a storm blew up. The storm damaged the ship and caused injury and property loss to its clients, who promptly sued. At the time common practice among tugs was to get weather information via hand signals from shore. Although radio had been introduced it was not common in use. The T.J. Hooper did not use radio, but if it had, the tug master would have known of the danger and been able to take its clients to shelter, thus avoiding damage to life, limb and property. The case turned on the question of T.J. Hooper’s responsibility: was adherence to common practice (e.g. hand signals) enough or did the situation demand “state of the art” (radio)? The courts ruled that, when important matters are at stake, the legal obligation is to use the state of the art. The T.J. Hooper case has been effectively used by educational authorities to demonstrate that in the United States, where schooling of the young is involved, schools must use the state of the art techniques and materials”.

In principle, the situation in the Member States of the European Union does not differ substantially from that in the United States. The importance attached to education and training in a “knowledge-driven society” calls for “state of the art” solutions.⁷

The “state of practice” of ITE may be characterized as problematic

Leaving teaching and learning at school aside, let us focus on ITE and start again with a statement of H. Judge (1990, 11): “*Teacher education (in England and Wales) is a product of history rather than of logic*”, adding that much progress might have been made in the past few years. This statement seems to hold true for most of the TE systems and programmes in the European Union and it refers to substantial curricular problems of ITE programs.⁸ It might be argued that theoretical and research-based argument, as well as rational system planning or the expertise of those involved in ITE, have not always played the most prominent roles in constructing and developing systems and models of ITE. To be more explicit, most programmes of ITE in the Member States of the European Union are based primarily on some form of common sense, beliefs, opinions and (unrealistic) expectations (idealizations, illusions) (cf. Buchberger 1994, Oelkers 1997). They combine studies in certain academic disciplines with some methodology courses, some (teaching/school) practice and some educational/professional studies. These components, as well as their different (and sometimes rather peculiar) combinations, frequently neglect the state-of-the-art knowledge on:

- (i) teaching, learning and TE (cf. Dick 1994, Oser 1997, Shulman 1987)
- (ii) sociology of knowledge (cf. Radtke 1996) or
- (iii) educational psychology (cf. Reusser 1994).

They may be seen as “collection code curricula” consisting of fragmented components with sometimes unclear relevance to teaching and learning, and as rather outdated “technology”. Obvious difficulties are frequently circumscribed with the fig leaf formula “theory-practice-problem”. Additionally, these common sense based (curricular) models of ITE may be seen as an enormous waste of resources.⁹

Curricular problems of ITE may be explained in many different ways:

- (i) T.Popkewitz (1993) speaks of a “social arena” of TE where different interest groups and lobbies try to keep their influence in a social “power game” (e.g. scientific/academic disciplines) and in which adaptations and re-orientations which are necessary because of changes in the context are not made.¹⁰

- (ii) General systems theory (Luhmann 1984) and a tendency of systems towards inner-systemic differentiations increasingly neglect the systems environment. Reluctance towards substantial curricular changes may be explained in this way.
- (iii) Educational sciences (including educational psychology or educational sociology) and especially a science of teaching, as relatively young academic disciplines, could not really establish themselves in many ITE curricula.¹¹
- (iv) A science of the teaching profession may be seen as not very well developed while much normative (not to say dogmatic) argument and lay technology (not tested on its effects) seems to dominate, especially as regards methodology.
- (v) A lack of pro-activity of institutions and staff of ITE who are not always aware of both the changing context of education/TE and the state-of-the-art knowledge produced in relevant academic fields of study.
- (vi) Problems with the recruitment and the career structures of staff in institutions of ITE. While decisions to become a teacher are sometimes perceived as “second best choices of the second best” (cf. Neave 1992), academic careers in TE do not seem to have the most prestige in academic circles.

Similarities to the curricula of ITE apply to the learning cultures adopted in many programs of ITE. Research on teaching and TE has highlighted the importance of the concept of “powerful learning environments” (cf. Buchberger *et al.* 1994). But, the evaluation report on TE in the European Union (Sander *et al.* 1996) clearly indicates that many programs of ITE are by and large oriented on outdated knowledge transmission models – a “preaching water and drinking wine-phenomenon”? Similarities apply to problem-, project- and research-oriented learning processes in ITE, which are missing from many models of ITE in the European Union (cf. as an exception the model of ITE adopted in Finland, Buchberger 1995).

As regards the practical/clinical component of ITE programmes, rather outdated apprenticeship models, or models oriented on the “practice-relevant experiences”, formula seem to dominate. Again, knowledge and practices available to provide “powerful learning environments” for prospective teachers to acquire a flexible repertoire of teaching actions is used to a limited extent only. Although a coherent and supervised teaching practice component provided by specially educated staff (in co-operative problem-solving groups) may be seen as a necessary condition for high quality ITE (e.g. Brenn *et al.* 1997), most models of ITE do not adopt the knowledge bases and scientifically validated practices available.

A coherent knowledge base component, an elaborated clinical component and a research component as well as their integration within ITE programmes are still missing. It would be easy to continue with a long list of examples of the methodological shortcomings of ITE. In short, ITE programs do not make intensive use of research-based knowledge and scientifically validated practices, and this fact is closely related to the unclear aims and goals of ITE (cf. Kennedy 1990), which include superficial and sometimes irrelevant content, sub-optimal methodologies and inappropriate learning cultures which are counterproductive to aims declared.

It is worth mentioning that some models and programmes of ITE in Member States of the European Union may be seen as counter-examples to what has been outlined. This is true in many ways of ITE at Finnish universities (cf. Buchberger 1995). In addition some promising approaches all over the European Union may bring about an improvement in the quality of ITE.¹²

(Research-based) knowledge bases for teaching and ITE do exist, but are used to a limited extent only

Much research-based knowledge has been developed on teaching and learning and to a smaller extent on several aspects of TE (e.g. *The Handbook of Research on Teaching* edited by Wittrock 1986, *The International Encyclopedia of Teaching and Teacher Education* edited by Anderson 1995, *The Handbook of Research on Teacher Education* edited first by Houston 1989 and then by Sikula *et al.* 1996, or *The Knowledge Base for Beginning Teachers* edited by Reynolds 1989). The use of this knowledge in teaching/learning in education at school or in TE programmes may lead to substantial improvements and help to reduce the sometimes severe shortcomings (e.g. predominance of knowledge transmission models of teaching). At the level of political decision making, at institutional (school) level and at an individual (classroom/teacher) level these scientific knowledge bases may contribute to more adequate decisions and better outcomes.¹³

At this point it may be asked:

- (i) Why are research-based knowledge and scientifically validated practices used only to a limited extent by institutions of TE and teachers?
- (ii) Why are most institutions of ITE reluctant to contribute pro-actively to an increase of the scientific knowledge bases of teaching and TE?
- (iii) How can politicians responsible for education in Member States of the European Union be made aware of the necessity for state of the art knowledge in teaching/learning and TE when advocating reform and improvement?¹⁴

Using scientific knowledge bases on teaching/learning and TE several commissions and committees have presented proposals to improve the curricula of ITE (cf. The Holmes Commission 1986, 1995; Bildungskommission NRW 1995; DGFE 1997). Considering a large body of knowledge submitted by the social sciences in general and the educational sciences in particular, Bildungskommission NRW submitted a proposal containing aims, content and methodologies for ITE programmes (embedded in an overall framework of TE). The integration into research-based knowledge of problem-oriented, research-oriented and co-operative learning processes within ITE should contribute to the development of the following professional competences of a trainee teacher. Each competence is split up into three to five subcompetences):

- (i) subject-related and “didactic”
- (ii) methodological (e.g. a broad repertoire of teaching/learning methodologies)
- (iii) management of learning groups
- (iv) diagnostic
- (v) counselling
- (vi) metacognitive
- (vii) ability to deal with (new) media
- (viii) co-operative skills

This coherent set of professional competences may form the basis for the development of ITE curricula and replace the rationales of common sense based curricula.¹⁵ As regards the clinical component of ITE, much knowledge on its effective organization has been acquired. The concepts of action research or of reflective practice provide input for more effective ITE. Similar concepts apply to teaching/learning strategies. Knowledge about the establishment of “powerful learning environments” in ITE is available, but used only to a limited extent.¹⁶

More research on teaching and ITE is indispensable to increase the scientific bases of teaching and ITE both in quantity and quality

At the meeting of the Standing Conference of Ministers of Education of the Council of the European Union the Swedish educational scientist U. Lundgren (1987) said: *“The amount given to research in education compared to the costs of education as a whole is minimal. If this fact is related to the demands on education the situation may be characterized as absurd. Even though comparisons of this sort are problematic, a comparison with companies or medical welfare underlines this absurdity. A company which were to plough back as few of its resources into research and development would not survive for long”*. This statement explicitly refers to one of the basic problems of education and TE: high expectations expressed, but a restricted commitment to fund research and development indispensable to improve them – a “knowledge driven society” without sufficiently developed scientifically based knowledge?

Proposing that more research is needed may sound popular, but not necessarily creative. As regards ITE the following aspects seem to be of the highest relevance:

- (i) ITE has to incorporate a clear (educational) research component into its curricula
- (ii) It seems to be indispensable that institutions of TE develop a clear commitment to (educational) research
- (iii) Prospective teachers should be provided with curricula and learning situations which give ample opportunity to them to become competent both in understanding educational research and in transforming it into pedagogical professionalism
- (iv) Prospective teachers should be given the opportunity to become “critical action researchers” (cf. Elliott 1998)
- (v) Teacher educators must become (educational) researchers themselves¹⁷
- (vi) Finally, living in times of ambiguity and contradiction, it may be asked which types of research identities might be adequate for (teacher) education ? (cf. Elliott 1998)

DF conceived as an integrative transformation science might have the potential to become the main science of/for the teaching profession

Before discussing the concept of DF as an integrative transformation science some additional arguments will be presented in support of the necessity to conceive DF as a science of/for the teaching profession.

Arguments in support of DF as an integrative transformation science

- (1) One of the main leitmotifs in improving TE and education at school during the past thirty years has been the “professionalization” of teaching and TE. In adopting an approach of pedagogical professionalism (cf. Combe, Helsper 1996) professional actions may be conceived of as cogent and justifiable transformations of scientifically based knowledge and practice in education, teaching and learning to particular cases by specially trained education staff considering the interests of the clients (e.g. students) involved. Both as prerequisite and consequence scientifically based knowledge and practice in education, teaching, studying and learning must exist.
- (2) For the teaching profession it has remained debatable, which science(-s) might form its scientific knowledge base(-s). As regards education at (lower and upper) secondary level of the school system in most of the Member States of the European Union prospective teachers receive most of their training in, frequently two, academic disciplines, while preparation for the main tasks of teachers (educating – providing teaching-studying-learning environments) is perceived as of minor importance. In most countries trainee teachers do not graduate in education (or educational sciences) but in other academic subjects. This fact may have a

tremendous impact on the development of the professional identities of trainee teachers. In addition to the basic problems of rather reluctant education policy decision-making behaviour, several other problems of integrating theories of teaching and learning, and theories of TE, may be a consequence of this.

- (3) Recently syllabuses as well as (the national) curricula of most of the Member States of the European Union may be evaluated as “common sense-based” (explainable in historical terms) collection code syllabi/curricula not always compatible with changed/rapidly changing tasks and expectations of society (cf. European Commission 1995) or the progress of scientific disciplines or changed patterns of knowledge production. Substantial reforms or restructurings of syllabuses and (national) curricula are still pending in most European Union Member States. Coherent curriculum research may be indispensable. The orientation of existing syllabuses and (national) curricula in some academic disciplines is somewhat problematic in at least four ways:
- (i) The fragmentation of syllabuses/curricula into (school) subjects corresponding to certain academic disciplines may be seen as a debatable pattern of organization of teaching/learning closely related to (although several years out of date and no longer applicable) industrial modes of production (cf. Taylorismus vs. Post-Fordismus).
 - (ii) The question still remains, why certain academic disciplines have been incorporated into the syllabuses/national curricula and others have been rejected or have recently been neglected (e.g. communication sciences).
 - (iii) A (sometimes hidden) assumption may be detected, in which correspondence of a particular academic discipline with a particular school subject is stated. While Seel (1999) has analysed the inappropriateness of this assumption for the (school) subject geography, Buchberger (1999) has submitted the argument that mother tongue teaching/learning as a subject at school has to integrate knowledge produced independently in more than 14 different academic disciplines. However, in attempts to establish a (school) subject “media culture competence” in the German education system Schoenert (1998) refers to 23 different academic disciplines, while focussing on the philological tradition of the academic discipline “Germanistik”.
 - (iv) The difference between the aims and tasks of (many) academic disciplines (production of explanatory knowledge structured systematically in a propositional format) on the one hand and the aims of teaching/learning on the other is often neglected, leading to severe problems.
- (4) Closely related to what has been said above, ITE and its programmes are split up into different and in many cases unrelated (academic) disciplines. These academic disciplines focus on the development of scientific knowledge/explanatory models and theories, and do not consider the phenomenon of teaching/studying/learning particular topics. The transformation of scientific knowledge structured propositionally and systematically into (human) knowledge structures following different patterns of organization (e.g. holistically, episodically) may frequently not be seen as an aim of academic disciplines and their fields of knowledge production. Additionally, a number of academic disciplines oriented on a philological tradition seem to devaluate the relevance of scientifically validated practices and show only limited interest in developing them, which may be perceived as problematic when it comes to teaching/studying/learning phenomena analysed by these academic disciplines.
- (5) Teaching, studying and learning may be defined as the central content of a science of/for the teaching profession. Teaching, studying and learning always:
- take place in certain contexts/environments (e.g. macro-systems, meso-systems, particular school, micro-system learning environment and learning situations)
 - have to be seen primarily as intentional actions of the actors involved
 - are directed towards aims and objectives

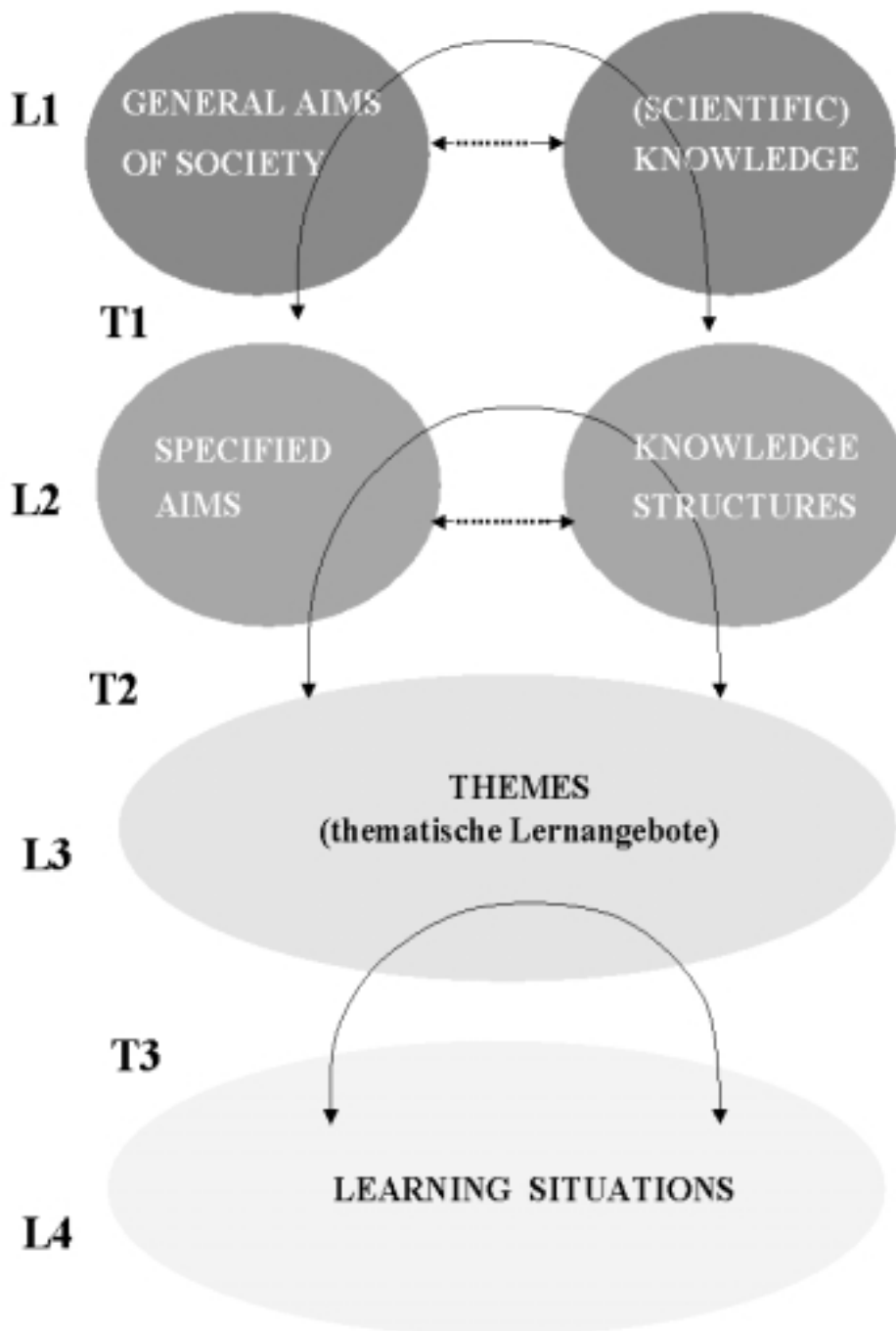
- have substance/content
 - may be supported by different media (e.g. teachers, teaching/learning aids)
- The focus is on the studying/learning processes of the student who has to be provided with learning situations appropriate for him or her to develop/construct his/her structures of meaning, knowledge and action. Supporting the construction of meaning on the one hand and on the other transmitting systematically defined and structured propositions are rather different in nature.

- (6) In a number of European cultural contexts Fachdidaktik(-en) in/of various fields could establish themselves as academic disciplines and have sometimes made remarkable progress. Various Fachdidaktiken have recently provided scientifically based knowledge and practices for teachers to establish learning situations in their respective fields. In many cases a tendency to isolate particular Fachdidaktiken from closely related ones, as well as a certain lack of integration may be observed – the individual learner might get lost, while expectations of a particular Fachdidaktik related to an academic discipline and its structures might become predominant. Similar criticism may apply to a holistic development of an individual. Are Fachdidaktiken able to define criteria for justifiable aims of Bildung/education and, if so, which criteria may be adopted by Fachdidaktiken to relate defined subject-specific aims to more general and holistic aims of Bildung/education? The frequently used justification of particular Fachdidaktiken, that they had to provide scientifically validated knowledge for different school subjects as defined by education politicians in (national) syllabi/curricula, could well give an impression of superficiality.¹⁸
- (7) The explosion of scientific knowledge and the process of fragmenting knowledge may be seen in close relationship to increasing illiteracy – even of highly educated individuals – in an increasing number of content areas. Procedures of knowledge transformation seem to become indispensable – another case for DF as an integrative transformation science of/for the teaching profession?
- (8) The production or design of scientifically validated practices and educational software may be seen as a rather neglected field of Didaktik as well as Fachdidaktik. Designing educational software calls for co-operation in collaborative problem-solving groups composed of experts in a number of different fields (e.g. Didaktik/Fachdidaktik, linguistics, communication sciences, telematics). In most countries of the European Union DF did not really cultivate the task of producing educational software and has given free rein to marketisation in this field, with obvious outcomes. It will be suggested that DF as an integrative transformation process should deal with the production/design of scientifically validated practices and educational software. Maybe it could then reduce the technological deficits obvious in the field of teaching, studying and learning hidden behind fig leaf formulae (e.g. “theory-practice-conflict”).¹⁹
- (9) Teaching, studying and learning in places called schools may be defined as the central content areas of DF, but the relative relevance of teaching and learning in places called schools in relation to other sources of learning (e.g. home, peers, community, mass media and the net) has to be considered in DF as an integrative transformation science.

DF as an integrative transformation science

Against this background a (preliminary) structural model of DF as an integrative transformation science will be discussed as follows:

- (a) The model of DF as an integrative transformation science consists of 4 different levels linked together by three different transformation processes.

DF as an integrative transformation science

- (b) At a first level we differentiate between “general aims of society” and “(scientific) knowledge” produced by the many different academic disciplines. The category “general aims of society” may be conceived as general (and, in particular societies, to a large extent collectively shared) patterns of interpreting phenomena of life and the world manifested in not very precisely defined (general) aims (gesellschaftliches Deutungswissen einschliesslich unspezifizierter Absichten/Rahmenzielstellungen). The category “(scientific) knowledge” refers to the huge amount of knowledge (and technologies) produced by the sciences.
- (c) “General aims of society” and “(scientific) knowledge” are either too unspecified or too extensive to be relevant to teaching, studying and learning. Both have to be transformed for teaching, studying and learning (transformation 1). General (and sometimes contradicting) aims of society

have to be transformed into more specified aims for teaching and learning (transformation 1). Concepts such as *Bildung* may have important roles to play in this transformation process (cf. Klafki 1992 and his concept of *Allgemeinbildung* oriented on key-problems of society). Propositionally formulated and systematically structured knowledge of particular academic disciplines has to be transformed into knowledge structures. Both transformations within the first transformation process may not be seen independently. While many interactions exist between “general aims of society” and “(scientific) knowledge” and its production, dialogues between representatives of society (democratic authorities) and the DF research community may be seen as imperative to the transformation necessary. As regards the transformation of “(scientific) knowledge” into knowledge structures, the dialogue between representatives of the different academic disciplines and the DF research community may be seen as a necessary condition.

- (d) “Specified aims” and “knowledge structures” may be seen then as the second level of DF. They form a potential pool of aims and knowledge structures to become the subjects of teaching, studying and learning.
- (e) In a second transformation process specified aims and knowledge structures have to be integrated to possible “thematic units” or “themes” (*thematische Lernangebote*) for teaching, studying and learning. Considering
- on the one hand the many aims possible and the huge amount of knowledge structures available and
 - on the other hand the limited resources, human information processing capacity and time available
- transformations of type 2 are indispensable. Transformation 2 has to result in a justifiable pool of “themes” or thematic units.
- (f) “Thematic units” or “themes” conceived as coherent sets of aims and content may be seen as level 3 of DF.
- (g) In a third transformation process “thematic units” are transformed into concrete learning situations (level 4). Learning situations may be characterized by the following components:
- context,
 - actors (e.g. teachers, learners), their characteristics and actions,
 - aims and objectives,
 - content/substance,
 - teaching/studying/learning strategies, and
 - media.
- (h) Having categorized “general aims of society” and “(scientific) knowledge” at the first level, and “learning situations” at the fourth does not imply superiority of the first or less relevance to “learning situations”. The model of DF as integrative transformation science intends to outline the integrated nature of the phenomenon under discussion which cannot be reduced to one or the other category/level or transformation.

The model of DF outlined might have enormous impact on restructuring TE (e.g. focus on teaching, studying and learning instead of academic disciplines), the organization of teaching and learning in schools (e.g. focus on learning situations and thematic units/problem areas instead of subject-matter structures) and the teaching profession (e.g. solid scientifically validated knowledge and practices which could contribute to empowerment and reduction of dependence on external and political control as well as on non-teaching related academic disciplines). Additionally, DF conceived as an integrative transformation science could open up new opportunities to tackle another often neglected problem of teaching and learning. It could provide a framework for the production of empirically validated teaching and learning technology/*Veraenderungswissen* (e.g. netbased learning environments and software) comparable to treatments/medicines in the medical sciences.

Producing and adopting scientific knowledge bases to improve teaching/learning and ITE calls for co-operative problem-solving processes of all the actors involved

Popkewitz (1993) has cogently characterized TE as a “social arena” with many actors with conflicting interests and different power. Many resources are wasted because of “power games” of different lobbies and interest groups and which accounts for inappropriate improvement (cf., for the situation in Germany, Oelkers 1998a, b). Adopting principles of general systems theory (cf. Luhmann 1984) it may be proposed that systems open to their environment produce more appropriate results, whilst the opposite applies to more closed systems. This suggests that systems should be more aware of their environments and their (inner) capacity for (self-) renewal stimulated. One major consequence is the need for co-operative problem-solving processes from all those involved in the improvement of a system – be it a TE institution or a particular school. These will mainly be education politicians, school administrators, (prospective) teachers and the scientific community including teacher educators, educational scientists and scientists from many fields of inquiry (not necessarily restricted to the traditional sciences, but corresponding to content areas of the recent curricula of schools). One of the main findings of the evaluation of TE reform in the United States indicates that co-operative problem-solving processes of all actors involved has to be seen as a necessary condition for progress (cf. Fullan *et al.* 1998).

Additionally, problems to be solved cannot be tackled adequately by one person, a small team of specialists in a particular field of inquiry or a particular research tradition alone. Interdisciplinarity and co-operation have become indispensable. Considering the limits of our information processing capacity this again calls for co-operative problem-solving groups. It seems necessary that individualistic and disciplinary-bound cultures of research have to be replaced by co-operative ones (cf. Shulman 1987 and his remarks on searching for missing links in research on teaching and learning). But many patterns of organization at universities and corresponding cultures of research may be seen as severe obstacles. If individuals avoid co-operation, neglect integration centered around the teaching/studying/learning process and do not pro-actively make use of the effects of synergy as well as existing (and developing) scientific knowledge bases they may easily find themselves – or remain – in the position of the famous German Baron Muenchhausen, who tried to pull himself out of a swamp by his tuft– without success.

II

Developing DF as a science of the teaching profession

Systems and programmes of TE in the Member States of the European Union may be characterized by some commonality and a rich variety of difference (cf. Buchberger 1994). Within these systems the role of scientific knowledge in teaching and learning is interpreted very differently and may range from a negative approach and ignorance to high esteem and highly developed academic cultures. This may be seen in close relationship to the state of development of a scientific knowledge base for teaching and learning. While some systems of TE have still remained in a pre-scientific state and focus on dogmatic, not to say normative, methodologies, others have been able to make use of scientific knowledge and have developed research cultures. With good reason it can be suggested that some basic elements of a science of/for the teaching profession has been developed which may form a valuable base for the further development of a science of/for the teaching profession (e.g. the research and development cultures at Finnish departments of TE at university faculties of education; Buchberger *et al.* 1994). The same applies to research and development centres for particular fields of teaching and learning (e.g. Institut fuer die Didaktik der Mathematik, Bielefeld/Germany) established in the seventies.

Developing a science of/for the teaching profession has to consider insights developed by innovation theory and has to be conceived as a change of a social (academic) system. In addition to what has

already been said on restructuring the curricula of ITE and schools, the following proposals are made to establish and to develop DF as a science of the teaching profession:

- (i) If institutions of TE make use of Wissenschaftsdidaktik and transform principles developed there to their own curricula and teaching/learning situations, some progress may be expected.
- (ii) Institutions of TE should be encouraged to establish co-operative problem-solving groups consisting of staff/researchers of different academic specializations and backgrounds. They should be encouraged to research on concrete problems/projects in an integrated manner.
- (iii) In institutional terms faculties of education seem to have considerable potential to provide appropriate research and development cultures.
- (iv) Centres of excellence might be established doing research and development in selected teaching/learning areas (e.g. The Centre for Multimedia Education at the Department of Teacher Education at Helsinki University, Tella 1998).
- (v) If statements in education policy documents (e.g. European Commission 1995) are to be more than lip-service, then coherent action at European Union level seems to be indispensable. We suggest the establishment of an all-European task force on teaching and learning dealing pro-actively and constructively with the problem areas mentioned in this paper. A special chapter on this issue might be included into the targeted socio-economic research programme (TSER) of the European Commission to provide the necessary resources.

Let us conclude with a modified statement of the Austrian poet E. Fried: *“Those who wish that teacher education and the teaching profession remain as they are, do not wish that they remain”*.

Notes

1. In the first two paragraphs commenting on major education and training policy documents we have frequently used the term “perceived”. This reflects the fact that (education) policy documents make use of the language of policy and aim at establishing certain patterns of discourse and thinking closely linked to the interests of particular political groups (e.g. neo-liberals). From this perspective reported policy documents and the issues contained in them may be seen as subjective interpretations and perceptions, not as “given facts” or “inescapable trends” (cf. Elliott 1998 and his comments on this phenomenon in dealing with education research identities).
2. “Quality” has become a slogan/formula with ambiguous meanings since the late eighties and has increasingly begun to dominate the education discourse (cf. Buchberger, Byrne 1995). Recently, it may be seen as one of the key concepts of the so-called New Public Management (NPM) aiming at a substantial restructuring of organizational and administrative patterns of education and training establishments (cf. Forneck 1997 and his critical comments on discrepancies between aims of education and aims of NPM).
3. The concept of “professionalization” has very different meanings in different European cultural contexts (cf. the issue on the theme of professionalization in the European Journal of Teacher Education, 2–3/1994, Bourdoncle 1994) which may be seen as a source of much misunderstanding. In addition to sociological interpretations of professionalization this umbrella concept can be interpreted as “paedagogische Professionalitaet” (pedagogical professionalism) (cf. Combe, Helsper 1996, Wagner 1998).
4. Kuenzli (1998) has recently adressed the problem of the development of a science for/of the teaching profession (Didaktik) and has submitted arguments to consider it as a “popular science” (“propaedeutische Populaerwissenschaft”).
5. Cf. the contributions of German, Scandinavian, English and American educationists in colloquia on “Didaktik and/ or Curriculum” (33. Beiheft der Zeitschrift fuer Paedagogik 1995, Gudem, Hopman 1998).
6. Kron (1994), Seel (1999) or Kansanen and Meri (1999) present more differentiated categorizations of the field of Didaktik by adopting criteria such as general, specific, content/subject matter or age.
7. The “T.J. Hooper”-decision of the US Supreme Court had substantial impact on special needs education in the USA. By analogy parents received the legal right for the best education provision for their disadvantaged children. It would be a fascinating case were parents in the European Union to sue providers of (compulsory) education because of suboptimal education provision (i.e. not following the state of the art knowledge on teaching/learning and sometimes perhaps with problems in relation to the Declaration of Human Rights) in various cultural contexts of the European Union.
8. Lanier and Little (1986) have described the many problems of curricula of ITE in the United States; Oelkers (1996,

- 1997) has submitted cogent analyses on the problematic state of ITE curricula in German speaking contexts.
9. Studies on the effectiveness and efficiency of ITE are still lacking. Recently a substantial study in Switzerland has tried to provide answers to this problem (cf. Oser 1997). Additionally, it is frequently mentioned that effects of ITE “are washed out” when young teachers enter the teaching profession (cf. Vonk 1994); that a “culture of induction” has not fully been developed and that “learning/professional development” at the working place, school, and its cultivation may be seen as blind spots of TE (Buchberger 1994). These facts may be brought into close relation to a suboptimal use of (especially human) resources.
 10. As regards syllabi Weniger has stated that syllabi/curricula have to be seen as the outcome of struggles between different political and social groups. Oelkers (1996) has analysed the influence of the (nation) state and governments on the curricula of ITE in Germany and has spoken of the influence of “Staatspaedagogik”.
 11. Oelkers (1996) has analysed the rather ambivalent relationship between the development process of educational sciences and TE in Germany. Reynolds 1998 has claimed the non-existence of educational sciences in England (while submitting at the same time a rather narrowly conceived conception of it, focussing on research on effectiveness of teaching and learning).
 12. Cf. the model of ITE oriented on professional standards (Oser 1997) or the descriptions of some reform projects of TE in Germany (Bayer *et al.* 1997).
 13. In a rather neutral form we have used the notions “making use of” scientific knowledge and that it might “contribute to” more adequate solutions. This reflects a position which acknowledges (i) the relevance of different types of knowledge (e.g. propositional knowledge, “tacit” knowledge, action-relevant knowledge), and (ii) takes into consideration social as well as affective components. This also reflects uncertainties in the relationships between different types of knowledge. There is much evidence that simple application models (of propositional knowledge to concrete problems) and knowledge transfer models seem to be inappropriate. More research on models of knowledge transformation seems to be necessary (cf. Kolbe 1997, Radtke 1996).
 14. Cf., for the situation in England, several articles in Mc Bride (1996), or for a more international perspective, contributions in Wideen and Grimmer (1995).
 15. While the model of Bildungskommission NRW reflects a challenging concept for TE reform as regards aims, content and methodologies, organizational as well as institutional issues are adressed in a rather conservative way and might be interpreted as avoidance behavior of reformers considering power structures in the “social arena” of TE (cf. Buchberger 1998a).
 16. Stern and Huber (1997) have submitted a comprehensive report on active learning in eight OECD member states. An all-European consortium is working on a Socrates curriculum development project (ALERT) making use of active learning methodologies in ITE. This project combines the potential of cognitive psychology, learning ecology, different European reform pedagogies, and net-based learning (cf. F. Buchberger 1999).
 17. The introduction of ITE into the higher education sector of the education system in German-speaking Switzerland has brought about heated discussions on the role of research in ITE. While these discussions have led – intellectually – to clarifications on the role of research in ITE, (possible) solutions again seem to reflect more power structures in a social arena than rational argument (cf. Grossenbacher *et al.* 1998).
 18. The Konferenz der Vorsitzenden Fachdidaktischer Fachgesellschaften in Germany has quite severely criticized efforts to establish more integrated models focussing on domain-specific didactics (Bereichsdidaktiken) instead of subject-related didactics in research and TE (e.g. Bereichsdidaktiken as “super sciences”). Unfortunately, rational argument has not been provided to support Bereichsdidaktiken – a case of struggles in the social arena of TE?
 19. In most education circles in German speaking countries “technology” or “technological theory” are perceived as “nasty words”, and there are frequent doubts about whether educational technology might even be possible. A comparison with health/medicine and “standard treatments” of medicine such as antibiotics might bring about new definitions of the problem area of teaching/studying/learning.

References

- ALISCH, L.-M. (1995) *Grundlagenanalyse der Paedagogik als strenge praktische Disziplin*. Berlin: Duncker and Humblodt.
- AMIN, S. (1997) *Capitalism in the Age of Globalisation*. London: Zed Books.
- ANDERSON, L. (ed.) (1995) *International Encyclopedia of Teaching and Teacher Education*. Oxford: Pergamon.
- BECK, U. (1997): *Was Heisst Globalisierung*. Suhrkamp: Frankfurt.
- BILDUNGSKOMMISSION NRW (1995) *Zukunft der Bildung – Schule der Zukunft*. Luchterhand: Neuwied.
- BOURDONCLE, R. (1994) Le professionnalisation des enseignants. *European Journal of Teacher Education*, 17, 13–23.
- BRENN, H., BUCHBERGER, F., EICHELBERGER, H., FREUND, J., HARB, H., KLEMENT, K., KUENZ, I., LOBENDANZ, A., TEML, H. (1997) *Berufspraktische Studien*. Studienverlag: Innsbruck.
- BUCHBERGER, F. (1994) Teacher Education in Europe – Diversity versus Uniformity. In GALTON, M., MOON, B. (eds.): *Handbook of Teacher Training in Europe*. Fulton: London: 14–50.

- BUCHBERGER, F. (1995) *Lehrerbildung auf dem Pruefstand*. Studienverlag: Innsbruck.
- BUCHBERGER, F. (1998a) Lehrer-Bildungsreform als Anliegen. In LENZ, W. (Hg.): *Bildungswege*. Studienverlag: Innsbruck: 38–58.
- BUCHBERGER, F. (1998b) (Bildungs-) Politiken in der EU – von Rhetoriken und Nachdenkensvermeidungen. In HERBER, H.-J., HOFMANN, F. (Hrsg.) *Schulpaedagogik und Lehrerbildung*. Innsbruck: Studienverlag: 45–62.
- BUCHBERGER, F. (1999) *Active Learning in Teacher Education (ALERT)*. <http://www.pa-linz/international/alert>.
- BUCHBERGER, F., BYRNE, K. (1995) Quality in Teacher Education: A Suppressed Theme. *European Journal of Teacher Education*, 18, 9–24.
- BUCHBERGER F., I. BUCHBERGER (1999) “Didaktik/Fachdidaktik” as science(-s) of the teaching profession. Chapter 5 of this publication.
- BUCHBERGER, F., DE CORTE, E., GROOMBRIDGE, B., KENNEDY, M. (1994) *Educational Studies and Teacher Education at Finnish Universities*. Helsinki.
- BUCHBERGER, I. (1999) *Competence in lingua franca and telematics for embryos?* <http://www.tntee.umu.se/>
- COMBE, A., HELSPER, W. (Hg.) (1996) *Paedagogische Professionalitaet*. Frankfurt: Suhrkamp.
- DGFE (1997) *Thesen zur Weiterentwicklung der Lehrerbildung*. Duisburg.
- DICK, L. (1994) *Vom unterrichtlichen Wissen zur Praxisreflexion*. Klinkhardt: Bad Heilbrunn.
- ELLIOTT, J. (1998) Living with Ambiguity and Contradiction: the Challenges for Educational Research in Positioning itself for the 21st Century. *Keynote address. ECER conference*. Ljubljana.
- EUROPAEISCHE KOMMISSION (1997) *Fuer ein Europa des Wissens*. KOM(97)563 final.
- EUROPEAN COMMISSION (1995) *Teaching and Learning: Towards the Learning Society*. Luxemburg.
- FORNECK, H. (1997) Wirkungsorientierte Schulen! Skeptische Ueberlegungen zum gegenwaertigen Stand der Reformdiskussion. *Beitraege zur Lehrerbildung*, 15, 69–81.
- FULLAN, M., GALLUZZO, G., MORRIS, P., WATSON, N. (1998) *The Rise and Stall of Teacher Education Reform*. AACTE: Washington.
- GARDNER, W. (1989) Preface, in Reynolds, M. (ed.): *Knowledge Base for the Beginning Teacher*. AACTE: Washington (ix–xii).
- GROSSENBACHER, S., SCHAERER, M., GRETHER, A. (1998) *Forschung und Entwicklung in der Lehrerinnen- und Lehrerbildung*. EDK: Bern.
- GUNDEM, B., HOPMAN, S. (eds.) (1998) *Didaktik and/or Curriculum*. New York: Lang.
- JUDGE, H. (1990) The Education of Teachers in England and Wales. In GUMPERT, E. (ed.): *Fit to Teach*. Atlanta: 7–30.
- JUDGE, H. (1998) A Beginning or an End? In FULLAN, M., GALLUZZO, G., MORRIS, P., WATSON, N. (1998): *The Rise and Stall of Teacher Education Reform*. AACTE: Washington (v–xiii).
- KANSANEN, P., MERI, M. (1999) The Didactic relation in the teaching-studying-learning process Chapter 8 of this publication.
- KENNEDY, M. (1990) Choosing a Goal for Professional Education. In HOUSTON, W. (ed.): *Handbook of Research on Teacher Education*. Macmillan: New York: 813–857.
- KLAFKI, W. (1992) *Neue Studien zur Bildungstheorie und Didaktik*. Beltz: Weinheim.
- KONFERENZ DER VORSITZENDEN FACHDIDAKTISCHER FACHGESELLSCHAFTEN (Hrsg.) (1998) *Fachdidaktik in Forschung und Lehre*. Kiel.
- KOLBE, F.-U. (1997) Lehrerbildung ohne normative Vorgaben fuer das praktische Handlungswissen. In BAYER, M., CARLE, U., WILDT, J. (Hrsg.): *Brennpunkt: Lehrerbildung*. Budrich and Leske: Opladen: 121–137.
- KRON, W. (1994) *Grundwissen Didaktik*. Reinhardt: Muenchen.
- KUENZLI, R. (1998) Didaktik – Doktrin in der Lehrerbildung und Forschungsgegenstand. *Beitraege zur Lehrerbildung*, 16, 29–38.
- LANIER, J., LITTLE, J. (1986) Research on Teacher Education. In WITTRICK, M. (ed.): *Handbook of Research on Teaching*. Macmillan: New York: 527–568.
- LUHMANN, N. (1984) *Soziale Systeme. Grundriss einer allgemeinen Theorie*. Suhrkamp: Frankfurt.
- LUNDGREN, U. (1987) *Challenges for Teachers and Their Education*. Strasbourg, Council of Europe
- MC BRIDE, R. (ed.) (1996) *Teacher Education Policy*. London: Falmer.
- NEAVE, G. (1992) *The Teaching Nation*. Oxford: Pergamon.
- OECD (1996) *Life-long learning for all*. Paris.
- OECD (1998) *Bildungspolitische Analyse*. Paris.
- OELKERS, J. (1996) Die Rolle der Erziehungswissenschaft in der Lehrerbildung. In HAENSEL, D., HUBER, L.: *Lehrerbildung neu denken und gestalten*. Beltz: Weinheim: 39–53.
- OELKERS, J. (1997) Effizienz und Evaluation in der Lehrerbildung. *Beitraege zur Lehrerbildung*, 15, 15–25.
- OELKERS, J. (1998a) Forschung in der Lehrerbildung. *Beitraege zur Lehrerbildung*, 16, 18–28.
- OELKERS, J. (1998b) Lehrerbildung – ein ungeloeses Problem. *Zeitschrift fuer Paedagogik*, 444 (3–6).
- OSER, F. (1997) Standards in der Lehrerbildung. *Beitraege zur Lehrerbildung*, 15, 26–37 und 210–228.
- POPKEWITZ, T. (1993) *Changing Patterns of Power*. SUNY: New York.

- RADTKE, F.-O. (1996) *Wissen und Koennen*. Budrich and Leske: Opladen.
- REUSSER, K. (1994) Die Rolle von Lehrerinnen und Lehrern neu denken: Kognitionspaedagogische Anmerkungen zur "neuen Lernkultur". *Beitraege zur Lehrerbildung*, 12, 19–37.
- REYNOLDS, B. (1998) *Better Teachers, Better Schools*. <http://www.teach-tta.gov.uk/speech.htm>
- REYNOLDS, M. (1989) *Knowledge Base for the Beginning Teacher*. AACTE: Washington.
- SANDER, T., BUCHBERGER, F., GREAVES, A., KALLOS, D. (eds.) (1996) *Teacher Education in Europe*: Osnabrueck (second revised edition: TNTEE Publications, Umea 1999).
- SCHOENERT, J. (1998) "Medienkulturkompetenz" als Ausbildungsleistung der Germanistik? *Der Deutschunterricht*, H.6/98, 62–69.
- SCHWAENKE, U. (1988) *Der Beruf des Lehrers*. Juventa: Muenchen.
- SEEL, H. (1999) "Didaktik" and "Subject Didactics" as Sciences of the Teaching Profession. Chapter 6 of this publication.
- SHULMAN, L. (1987) Knowledge and Teaching: Foundations of the New Reform. *Harvard Educational Review*, 57 1–22.
- SIKULA, J. (1996) Introduction. In SIKULA, J., BUTTERY, T., GUYTON, E. (eds.): *Handbook of Research on Teacher Education*. Second edition. New York: Macmillan (xv–xxiii).
- STERN, D., HUBER, G. (eds.) (1997) *Active Learning for Students and Teachers*. Lang: Frankfurt.
- TELLA, S. (ed.) (1998) *Aspects of Media Education. Strategic Imperatives in the Information Age*. Helsinki: MEP (8).
- THE HOLMES COMMISSION (1986) *Tomorrow's Teachers*. East Lansing.
- THE HOLMES COMMISSION (1995) *Tomorrow's Schools of Education*. East Lansing.
- WAGNER, H.-J. (1998) *Eine Theorie paedagogischer Professionalitaet*. Weinheim: Beltz.
- WIDEEN, M., GRIMMETT, P. (eds.) (1995) *Changing Times in Teacher Education*. London: Falmer.
- WITTROCK, M. (ed.) (1986) *Handbook of Research on Teaching*. Macmillan, New York.

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