PATH DEPENDENCE AND POLICY STEERING IN THE SOCIAL SCIENCES: THE VARIED IMPACT OF INTERNATIONAL LARGE SCALE STUDENT ASSESSMENT ON THE EDUCATIONAL SCIENCES IN FOUR EUROPEAN COUNTRIES

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ABSTRACT

The aim of this article is to explain commonalities and differences in the responses of four national educational science communities to the same external stimulus, namely international comparative large scale student assessments that offered vastly improved comparability of national results from the beginning of the 1990s. The comparison shows the epistemic traditions of educational research in the four countries and

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properties of the data produced by the international comparative studies to be the central explanatory factors for commonalities and differences of responses to the new studies.

Keywords: PISA studies; educational sciences; epistemic traditions; state interests

INTRODUCTION

While most fields of research are spread across many countries, the degree to which they are truly internationalised varies enormously. At one end of the spectrum we find completely internationalised fields in which all qualified researchers, regardless of their country of origin or residence, address similar problems in similar ways. While preferences for particular themes or approaches may vary between countries, these are variations within a joint enterprise that is advanced by contributions from all these countries. The contributions fit because the knowledge from which problems are derived and methodological standards of research are shared across countries.

In contrast, there are many fields in which goals and approaches are more nationally or regionally specific. Applied research, for instance, often addresses innovation needs or societal problems of only one or few countries (Luukkonen, Persson, & Sivertsen, 1992). In other cases, the language in which research is communicated is central to the research effort, and will thus separate researchers in a country or a group of countries from others working on similar problems. In yet other cases, the empirical object of the research is nationally specific, for example for palaeontology (Reguant & Casadella, 1994) or for research on social phenomena that exist in only one country (Mayntz, 2001, pp. 20–27). In the most nationally specific cases, research problems, empirical objects and communication media are all exclusively national.

The educational sciences have a range of features that are close to both of these poles. They typically investigate nationally specific empirical objects (education systems) and are often geared towards contributions to the improvements of these systems. It comes as no surprise that educational researchers in each country have a strong national focus and that research traditions vary between countries. At the same time, the possibility of

international comparative large scale student assessments (ILSA) in various subjects indicates that many education systems share basic features including what is taught, at what age of the students it is taught, how it is taught and by what organisations it is taught. Research on these phenomena can be expected to address similar problems and to produce results that can be transferred between national contexts, thereby constituting an international field.

Why is it, then, that education researchers in four European countries responded to the emergence and rise of international large scale student assessments in different ways? Why was the educational science community of one country (Sweden) involved in the very early stages of these developments but lost interest at a time when 'true comparability' was achieved, while the community of another country (Netherlands) was never really interested at all, the community of a third country (Switzerland) only after the whole enterprise had been under way for quite a while, and some researchers in a fourth country (Germany) became excited, mobilised resources for educational science at a scale previously unheard of, and created a new subfield of educational science that led to a split of their national professional association? The stimulus these national communities responded to was the same for all of them, namely the efforts by an international elite and two international organisations to compare student achievements across a large number of countries.

The aim of this article is to explain commonalities and differences in the responses of four national educational science communities to the same external stimulus, namely international comparative large scale student assessments that offered vastly improved comparability of national results from the beginning of the 1990s. We link commonalities and differences in the responses to the epistemic traditions in the educational research of the four countries, to political structures and state interests, and to properties of the data produced by the international comparative studies.

In the next section, we provide a brief overview of the history leading to the new ILSA studies, of the changes that justify the term 'new ILSA studies', and of our empirical investigation. We then present case studies on the impact the participation in these assessments had in the four countries. A comparison of these cases reveals the central explanatory factors for commonalities and differences of responses to the new ILSA studies by the four national educational science communities. Our conclusions focus on the tension between the political demand for comparative data and attempts to make scientific use of them.

COMPARING THE IMPACT OF INTERNATIONAL LARGE SCALE STUDENT ASSESSMENTS

The Emergence of 'New ILSA Studies'

The basic idea of international comparative large scale student achievement studies is to compare the outcomes of education in the participating countries by submitting students in primary and secondary education to standardised tests of their knowledge and abilities. The attempts to conduct international comparative studies of student achievement date back to the 1930s of the 20th century, were interrupted by World War II, and were put on the agenda again by the UNESCO in the 1950s. In 1958, the International Educational Association (IEA) was founded by a group of leading educational research institutions under the direction of the UNESCO and began to regularly conduct comparative achievement studies of students in different subjects across nations (Grisay & Griffin, 2006).

Early comparative studies of student achievements suffered from methodological problems that limited the value of comparisons between countries. Available statistics were limited, the degree of standardisation was insufficient to guarantee data comparability, and the methodology was not sufficiently advanced to support quantitative comparisons. It was only at the beginning of the 1990s that the methodological quality of such studies was improved sufficiently to meet accepted standards of comparative quantitative research. These improvements included *Rasch Scales*, *Item Response Theory* and *Plausible Value Technique* as well as *matrix sampling*, which enables the coverage of larger areas of the curriculum without increasing the number of questions an individual student had to answer. These new tools significantly improved opportunities for comparative analyses. They were first used by the IEA at the beginning of the 1990s in the preparation of the Third International Mathematics and Science Study (TIMSS), in which all four countries under investigation participated, and are now applied in all ILSA studies.

In addition to these methodological improvements, the organisation of the ILSA studies underwent a change in the early 1990s. The studies became hierarchically organised and standardized. More international players entered the scene. At the end of the 1990s, the OECD introduced the Programme for International Student Assessment (PISA) studies, in which all four countries investigated here also participated (Grisay & Griffin, 2006).

As a result of these developments, all four countries were confronted by the same external stimulus from the beginning of the 1990s. They were expected to become part of hierarchically organised, standardized, methodologically advanced comparative studies of student achievements (Table 1). These studies were run by international organisations in collaboration with an international elite of educational researchers, and were aimed at providing data for educational policy-makers in the participating countries. They measured student achievements in various subjects on the basis of strictly equivalent instruments, common definitions of target populations and standardised procedures. They also included a limited set of context variables on different levels including variables describing the organisation of school education in each country, instructional practices and student characteristics.

As a result, even countries that had previously participated in ILSA studies were confronted by a new instrument, new data collection protocols and new opportunities to conduct international and national comparisons of student achievements. This is why the changes in the early 1990s can be conceptualised as a stimulus to educational science communities. The stimulus made possible a wide range of responses by national educational

Table 1. New ILSA Studies and Participation of the Four Countries.

Time	Study	Netherlands	Sweden	Switzerland	Germany
1994–1997	Third International Mathematics and Science Study (TIMSS)	X	X	X	X
2000	Programme for International Student Assessment (PISA)	X	X	X	X
2001	Progress in International Reading Literacy Study (PIRLS)	X	X		X
2003	PISA	X	X	X	X
2003	TIMSS	X	X		X
2006	PISA	X	X	X	X
2006	PIRLS	X	X		X
2007	TIMSS	X	X		X
2009	PISA	X	X	X	X

science communities and national policy-makers with regard to the design of the studies, the collection of the data and the analysis of data.

The Empirical Investigation

Our investigation of responses to the 'new ILSA studies' was part of the Restructuring of Higher Education and Scientific Innovation (RHESI) project, a comparative investigation of the impact of changing authority relations in the public sciences on the opportunities for scientific innovations, summarised in the introduction to this volume. We conceptualised the new ILSA studies as such an innovation and asked how the authority relations in the four countries affected the changes in research practices that were required by the conduct of national parts of ILSA studies and enabled by the new research opportunities the ILSA data provide.

The empirical investigation was based on interviews with researchers who conducted ILSA studies (administered the national surveys or contributed to the development of the methodology) or used ILSA data for secondary analyses, observers of the field, policy-makers and administrators at universities (Table 2). Interviews with ILSA researchers focused on the conditions under which they moved to producing or working with ILSA data. In addition, we used a rich body of written sources including discussions of ILSA studies in the national educational science communities, reports, biographies and websites of the organisations conducting ILSA studies.

Our analysis revealed major differences between the impact of the new ILSA studies and that of the other innovations studied by the RHESI project (see the contributions by Laudel et al. and Engwall et al. to this volume). While the change of research practices by individual researchers was crucial for understanding the impact of authority relations on the

Table 2. Interviews Conducted in the Four Countries.

	Netherlands	Sweden	Switzerland	Germany
ILSA researchers	7	5	6	11
Others		2 policy-makers	7 observers	2 observers
			5 university managers	2 funders
Total	7	7	18	15

development of innovations in the other three cases, the conditions for, and effects of, the new ILSA studies were mostly determined at the level of national educational research communities and their interaction with the state and international agencies.

An important condition that modifies the impact of authority relations on changes of research practices is the epistemic structure of the field(s) in which an innovation occurs. This epistemic structure is only partly reflected in its authority structure, particularly the degree to which a unitary elite can exercise authority over research goals and standards for research. Our analysis therefore focused on the following questions:

- What were the major research traditions in the national educational science fields that provided connection points for the new ILSA studies?
- How were educational researchers of a country involved in the early development of ILSA studies prior to the 1990s?
- How was educational research institutionalised in the beginning of the 1990s?
- How was participation in the new ILSA studies organised?
- What skills had to be learned by researchers conducting the new ILSA studies and analysing the data?
- Did researchers of a country take part in the development of the new ILSA methodology?
- Did educational researchers collect additional data in connection with the new ILSA studies?
- How were ILSA data used? What research questions were answered using ILSA data?
- What was the impact of the new ILSA studies on the national educational science community?

These questions are now answered by four brief case studies, whose subsequent comparative analyses will reveal the factors shaping national responses.

ONE STIMULUS, FOUR DIFFERENT RESPONSES

The Netherlands: ILSA as Distraction

At the beginning of the 1990s, Dutch educational sciences had a strong quantitative research tradition. Quantitative methods had diffused

into educational sciences in the Netherlands since the 1980s, and were common and accepted within several subfields from the 1990s. One of the subfields of Dutch educational research, school effectiveness research, even addressed research questions very similar to those of ILSA studies. The Netherlands was the only country with strong school effectiveness research besides the United States and the United Kingdom (Creemers & Scheerens, 1994; Ditton, 2009, p. 252). Research focused on influences on student performance at different levels of aggregation such as the individual student, the classroom, and the national education system. It differed from other subfields of educational science in its inclusion of an international comparative perspective. Already in 1968, the Dutch government founded the National Institute for Educational Measurement (CITO), one of the first institutes for educational measurement worldwide. CITO has developed educational tests for monitoring and evaluation purposes.

Dutch educational scientists actively participated in ILSA studies as members and chairs of international steering committees from the 1980s. When Tjeerd Plomp chaired the steering committee of TIMSS and the IEA (1989–1999), his research institute was the national hub for the Dutch parts of these studies. However, Dutch researchers contributed little to the methodological research that prepared the 'new' ILSA studies from the early 1990s. These contributions primarily came from the United States, United Kingdom, Germany and Sweden (Keeves & Lietz, 2011).

The participation in the 'new' ILSA studies could build on these research traditions and on a well-established and institutionalised field of educational science. A substantial part of educational research had been organised in five research institutes which, though part of universities, almost entirely depended on external research contracts with the state. Additionally, educational science was (and still is) conducted within some university faculties, for example psychology departments.

The costs of participation were met by the state who issued calls for tenders to administer ILSA studies in the Netherlands. Researchers apply for the administration of these studies because they need the funding. The PISA studies are now administered by CITO, which was transformed into a commercial research organisation that also develops tests for national achievement studies.

As a consequence, data production was more or less a routine task even though it was time-consuming and required considerable skills. All researchers who used ILSA data were trained in quantitative educational science methods, which made learning of specific analytical methods unnecessary. Owing to the wide acceptance of quantitative educational research,

Dutch participants in ILSA studies didn't have reputational problems either.

The researchers who were involved in the data production had hardly any influence on the content and methodology of the studies, which separated it from their own research interests. The main task of those who conducted the Dutch part of an ILSA study was to develop a sampling strategy for their country.

> A: You probably know about those international studies that there are only very few margins which you can use yourself because more or less all is dictated by international agencies. So I didn't have any input on what we were doing at [a certain ILSA study].
>
> Q: So you have got basically the Dutch part and had to follow the instructions?
>
> A: Yes, you could say that, definitely.[1]

Other attempts by Dutch educational researchers to influence the international data production failed, too. One researcher succeeded to include an important variable (to him) in the Dutch national survey but did not achieve the same change on the international level:

> I never did this on the international level, this is impossible. Because it is an intergovernmental body, PISA and OECD. And there I don't have influence. This doesn't mean that the secretariat doesn't know that I do this. I gave a lecture at the PISA office […] They found it nice, and that was that.

In the Netherlands, ILSA studies did not trigger additional data collection because there has always been a research tradition of quantitative comparative school effectiveness research, which continued independently of the ILSA studies. Dutch educational researchers have conducted regular longitudinal national studies of student achievements since 1988. The ministry was interested in the regular monitoring of student performance in primary and secondary schools and in factors influencing performance (Kuyper & van der Werf, 2012, pp. 1–6).

So far, ILSA data have been used almost exclusively for national reports demanded by the state. One of the reasons why ILSA data are rarely used for research is the scarcity of time. Researchers who had main responsibilities in the ILSA data collection and had an intimate knowledge of the survey data lacked the time for using the data because they had to administer the national surveys, while their colleagues depended on contract research in other areas to fund their own positions. Meanwhile, the Dutch research council granted a larger project proposal of four research groups that proposed an extensive use of ILSA data.

A second reason for the reluctance of Dutch educational researchers to use PISA data is their dominant interest in their national educational system, which makes data on other countries and comparisons with other countries less interesting. The national focus is reinforced by the interests of the Dutch ministry of education, which still is the major funder of educational research.

A third important reason why Dutch educational researchers don't use ILSA data is the nature of the data themselves. Researchers consider these data unsuitable for answering their research questions and as generally inferior to the national data they produce independently of ILSA studies. According to the Dutch educational researchers interviewed, the current important research questions of the field require longitudinal data, which the ILSA studies don't provide (see also Dronkers & Robert, 2008, p. 549).

> What is the biggest downside of PISA is that it is cross-sectional. That's a main problem certainly in the Dutch context where we have much better data if we would only analyze Dutch kids. So we have the VOCL cohorts previously, now the COOL data. These longitudinal data are much better potentially than PISA …. We can answer important questions which you can't answer in PISA, which is the extent to which choices in education are based on performances or to what extent something else is happening in the choice processes, and you can't assess that because you need to have prior information about their school test result and then see what happens in the choices later on, so you need to longitudinal data. (Dutch educational researcher)

Those few Dutch educational researchers who used ILSA data did so because they were interested in international comparisons. They often used these data in an opportunistic way, in combination with national data and other international data such as the European Social Survey. Only two researchers used ILSA data regularly. One of them, an educational sociologist, saw the data as crucial for establishing a new line of research:

> I realized these are very rich data for the things that I want – so looking at the educational systems and how are they different between countries. […] basically if you look at the comparative stratification literature, for example the field that prepared me for getting into [this] project, it's very important to look at the level of stratification of educational systems.

Although Dutch educational research is still predominantly oriented towards the national education system, publications of research with ILSA data were accepted by the community.

Overall, the impact of the 'new' ILSA studies on the Dutch educational science community was rather low. Data production was considered a routine process by most, and the few researchers who wanted utilise the ILSA data collection for their own research failed due to the rigidity of the international data collection protocol. The data produced by ILSA studies are

rarely used, mainly because there is little interest in research questions that can be answered with these data. This situation might change due to recent research council funding for research using ILSA data.

Sweden: Focus on Methodology

The Swedish community of educational science has over time changed into being increasingly multi-disciplinary and fragmented (Hansen & Lindblad, 2010). Many of the early educational researchers were educational psychologists. Most research in educational science was, and still is, provided by departments of pedagogy located in faculties of social sciences at public universities. Historically, the role of quantitative research in pedagogy has been strong in Sweden. However, quantitative research gradually lost its significance in the 1970s as a more societal-oriented and qualitative approach in research methodology was introduced in pedagogy:

> There was skepticism about the more quantitatively oriented pedagogy in Sweden during the 70- and 80-centuries, Husén [a pioneer of early ILSA studies, see below] was not Prophet in his own laboratory, so to speak…

The new approach was also reflected in policy-making in education. As an outcome, pedagogical research became increasingly separated from quantitative methods and measurements as well as approaches inspired by psychology. In addition, academic courses in statistics disappeared in the national curriculum in pedagogy at undergraduate and postgraduate levels. More recently, interest in quantitative methods has increased again, especially in pedagogy. Sweden is considered by interviewees as having a strong international reputation in statistics and statistical analysis.

Swedish participation in ILSA studies is embedded in its long tradition of studying the efficiency of the Swedish national education system. In 1992 and 1995, two larger national studies were conducted which, however, used less advanced methodologies than the international studies.

Sweden actively participated in ILSA studies from the beginning. The heyday of ILSA studies in Sweden appeared in the late 1950s and was strongly linked to enthusiastic pioneers such as professor Husén and the establishment of IEA and its first international studies. After a period of regression, interest increased again when international large scale student assessments were transformed into more reliable and systematic test models in the late 1980s and 1990s.

Participation in primary ILSA studies has never been a problem in Sweden in financial or reputational terms. Swedish statisticians have been central in the development of the ILSA methodologies both before and after the early 1990s. For instance they have been successful with developing computer programs for multivariate statistical analysis such as LISREL, being known as 'the state of the art' and used in ILSA analysis.

The Swedish National Agency for Education, which was established in 1991, is the central authoritative agency in this field. It is also responsible for the national implementation of the ILSA studies and funds the primary studies on behalf of the government. The administration and coordination of the national implementations of ILSA studies are contracted out to project groups operating at public universities following a competitive application procedure, based on criteria such as reputation and the international background of the university as well as the potential of the university to create a good research environment. The project groups are coordinated by researchers acting as national project leaders. The national operations of project groups such as the reporting of raw data are strongly controlled by national and international authorities. Their discretion is limited to the sampling strategy (on the basis of predetermined selection criteria).

The project groups responsible for producing LSA data at the national level are free to include additional questions for studying specific aspects at the national level not being covered by the standardized assessments. In 2011, a national network, supported by the National Research Council, was established for contributing to re-analyses of large-scale studies. One of its aims is to complement large-scale studies with the collection of qualitative data.

As in the other countries, the main target of the international large scale student assessments and their results in Sweden is policy-makers, followed by school principals and teachers. Most of the results of primary data analysis are published in form of national reports and as shorter summaries, which are co-published by the national project groups and the National Agency for Education.

In some cases, the National Agency orders in-depth analyses of certain areas of the tests. Researchers at Swedish universities studied the validity of TIMSS and PISA surveys with a focus on the relevance of international tests for the Swedish curriculum, and on comparisons to national tests. Similar studies were conducted in the area of reading comprehension. In the mid-1990s, the private funding agency *Riksbankens Jubileumsfond* funded a project at Gothenburg University that created a modern computer-based public domain covering all ILSA studies conducted in

Sweden before 1995. The aim was to make old ILSA data 'analysable' and comparable by translating it into a format that is compatible with modern software.

Most of the researchers who were interested in using ILSA data moved into the field due to their strong methodological research interest.

> It was mainly my interest in method that led me to my involvement in re-analysis studies of ILSA data. [A colleague] led a project in which I got involved where we did two-level analyses using structural equation modeling, first developed by Bengt Muten. These methods have been regarded as extremely complex and even though we had special competence within these areas we also ran into problems, we had to focus much on developing new computer programs.

Beyond these methodological studies, the size and scope of this field is still limited, and it is mainly concentrated in the central research environments of Sweden such as Gothenburg, Umeå and Mid Sweden University. Some of the researchers involved in primary ILSA studies have also used the data for secondary analyses. However, the tight schedule for running and administering the ILSA tests often reduces the flexibility of researchers to use the data. This is why they are often unable to exploit their good access to data and proper knowledge about the data sample for doing such studies. Researchers also reported financial obstacles:

> It is very time consuming to prepare and analyse the data and from that also to author papers. It is hard to finance this type of research; in Sweden it seems almost impossible…

A second reason for the limited use of primary data in Sweden is their complex structure, which requires highly advanced quantitative methods of data analysis. Interviewees described this as a result of the shift from the experimental and research inspired design of the old ILSA studies to a more evaluation-focused research agenda. The design of the tests used in ILSA studies and the sampling strategies make it impossible to use the methods of quantitative data analysis most quantitative pedagogical researchers are familiar with. Some knowledge of psychometrics, econometrics and advanced statistics is required. Owing to a relapse of interest (and, consequently, education) in quantitative methods, only few Swedish educational researchers are currently able to conduct causal analyses with ILSA data. This is why both young and more established scholars who were interested in ILSA data experienced a need for further methodological training before conducting secondary analyses. In order to learn how to use ILSA data, researchers participate at specific workshops being organised by international organisations.

More recently, other academic disciplines such as economics, political science and statistics have started to use ILSA data (Forsberg & Lindberg, 2010). Also, the National Agency of Education has arranged a seminar series together with the National Research Council to encourage researchers to do in-depth analysis of test results.

So far, the major impact of the 'new' ILSA studies on the Swedish community is a re-awakening of the methodological interest in quantitative studies. By now, many of the younger researchers involved in the production of primary data have invested time in learning how to use the standardized statistical methods and tests developed by the international organisations. Research questions around ILSA are mostly methodological, and the use of ILSA data is seen as hampered by an insufficient understanding of its methodology, which has to be overcome first. However, researchers are turning towards secondary analyses of ILSA data, a trend that is encouraged by policy actors and research councils.

Switzerland: Routine Data Collection and Slow but Steady Institutionalisation of Data Use

In the early 1990s, educational research in Switzerland was even more strongly fragmented than that of other countries because the multiplicity of cantonal education systems in a federal state, linguistic and cultural diversity, and the co-existence of hermeneutic and empirical research traditions added to the traditional multi-disciplinary nature of education research.

Despite this fragmentation, two main topics dominated Swiss educational research in the 1990s: the role of compulsory education and a growing interest in the study of effects of educational processes (Gretler, 2000). Both topics provided a fertile ground on which the participation in and use of ILSA studies could grow. However, the quantitative research tradition was rather weak in Switzerland, and varied with the size of cantonal offices for educational research. Cantons with larger offices conducted more educational research and thus had a stronger interest in these methods than smaller offices with fewer researchers.

Prior to 1995, only some of the Swiss cantons sporadically participated in ILSA studies (e.g. the canton of Geneva in 1959), which is consistent with the cantonal authority over education. The first participation of Switzerland as a country occurred when the country joined TIMSS in 1995.

Educational research in Switzerland is institutionalized in a variety of public research organisations. In the early 1990s, this mostly took place in Cantonal Universities and in Cantonal Offices for Educational Research. The Universities of Teacher Education, which provide teacher education as Universities of Applied Science since 1995, are likely to become another type of organisation in which educational research relevant to ILSA studies is conducted. However, this has not happened yet despite early local attempts and a specific funding instrument supporting cooperation between cantonal universities and universities of applied sciences being introduced by the Swiss National Funds (SNF), which has awakened the interest of some researchers in ILSA studies.

After the TIMSS study, the political decision was made that Switzerland should only participate in one type of ILSA study, namely PISA. Funding and management of the participation also changed. The research council funding, which was oriented towards research in education, was replaced by a funding scheme for the management of the study. Funding is split between the confederation (60%) and the Swiss Conference of Cantonal Ministers of Education (40%). The Swiss Federal Statistical Office was tasked with PISA data collection and management. The analysis of PISA data is conducted ad hoc by consortia of researchers, which in 2008 also took over data collection from the federal statistical office. This move was motivated by the restrictions the statistical office put on the access to data and on additional analyses. When forming consortia, researchers already had experiences with large-scale quantitative studies. They participated in OECD training workshops to acquire the specific methodological expertise required for PISA analyses.

While the members of the consortia were mainly concerned with producing data and ad hoc analyses, other Swiss researchers linked additional research to the Swiss national parts of the ILSA studies. The researchers conducting TIMSS complemented the comparative tests of achievements by collecting and analysing video data. In a project funded by the SNF, researchers filmed and analysed mathematics lessons with students who participated in TIMSS in order to understand the main determinants of educational success. SNF funding also motivated researchers to link the study of transitions from education to work to the PISA studies. The longitudinal study 'Transitions from Education to Employment' (TREE) was initiated by a researcher from a cantonal office for educational research in 1999 following a recommendation by the OECD. The PISA 2000 data collection provided a window of opportunity for this project, which followed the educational and vocational pathways of the 6,000 students who took part in the PISA study.

PISA data are still rarely used for research beyond data analysis for education policy. Research in the educational sciences is highly individualised, with each researcher striving for an original approach and using their home discipline (sociology, psychology, and economics) rather than educational science as their major frame of reference.

These approaches included critical perspectives on PISA and research questions that did not entirely fit the international PISA methodology and data. Swiss researchers tried to avoid the hierarchically organised and standardized studies in order to critically investigate PISA data (usually by additional research).

> To say it very shortly, and maybe a little bit extreme, these data, TIMSS and PISA, they are good for politics, but they are not very useful for teacher education and for teachers, on this level. If you want to use this kind of data, than you have to go far beyond this kind of system monitoring (…).

A second reason is that the access to recent data has been restricted – at least initially – to those who produced the data.

> For example, there were guidelines regulating the access to data for external researchers [researchers who were not members of the consortia conducting the primary studies]. And often it was like this: 'PISA data will be given to researchers who are in the group, the consortium' – usually six months before publication, because they have to prepare the national report. 'And then for a year after the publication of data, there will be no access to the data. They will have to wait.' So they did everything to block access to external researchers to PISA data.

The use of ILSA data is likely to increase now that the access to data is controlled by researchers, and due to initiatives by several universities to institutionalise educational research linked to ILSA studies. Until 2012, however, the use of ILSA data at the cantonal level was still restricted for researchers who were not involved in the data production. They faced a one-year embargo before they could access the data.

Several Swiss universities responded to the growing state interest by institutionalizing ILSA-related research more strongly. In two universities, new research centres were created. In 1999, the University of Zürich created a Competence Centre for Educational Evaluation, which was transformed into a self-funded Institute for Educational Evaluation in 2003. The director of the institute also is the national coordinator of the PISA consortium. At the University of Bern, the Research Center for Educational Economy was founded in 2001. It was asked by the national PISA steering group to study the influence of students' social background on their performance in PISA tests. In addition to these centres, the University of Geneva's

department of education created a professorship for the analysis of effects of education systems. These developments point to a slow growth of the Swiss educational science community, or at least of the part of the community engaged with ILSA studies.

Germany: ILSA as Kick-Start of a Quantitative Education Research Community

In the beginning of the 1990s, German educational sciences were dominated by a hermeneutic research tradition that was focused on the understanding of interactions between teacher and student. It was assumed that the effects of school education exclusively depended on these interactions, which were treated as specific to each classroom situation. In this paradigm of educational science there was no room for quantitative comparative research.

Quantitative educational research was also close to impossible in Germany at that time because researchers could not produce appropriate empirical data. Access to data (including data collection in classrooms) had to be granted by the federal states, which withdraw their initial permission after being disappointed by the low scientific quality of studies in the 1960s and 1970s. As a consequence, Germany ceased participation in international comparative studies, and quantitative research came to a halt for almost three decades.

> The 1980 and 1990s, before TIMSS, had actually been dead years for German empirical educational research.

Since there was no quantitative educational research in Germany at the beginning of the 1990s, there was no community in which reputations could be earned with conducting ILSA studies or quantitative educational research in general. There were no positions or research infrastructures at universities and only limited research infrastructures at public research institutes. There was no project funding for quantitative educational research, and it was impossible to build a career in educational science on the basis of quantitative studies. Only few researchers remained who had the knowledge required by a participation in ILSA studies. Political support for ILSA research was also low.

This relapse occurred after some German researchers had been involved in the early ILSA movement. These researchers (among them the Germany-based Neville Postlethwaite) were outsiders to the German

educational science community. They were based in state-funded research institutes outside universities, which also supported the early participation in ILSA studies prior to the denial of access to data by the federal states.

The prospects of ILSA studies changed fundamentally when, after many years of neglect, political actors developed an interest in international comparative and intra-German comparative data on school effectiveness. After German reunification, a lack of knowledge that could inform the governance of the educational sector became apparent and education policymakers became interested in Germany participating in ILSA studies. They granted researchers access to schools and turned to the only organisations that could possibly manage this participation in ILSA studies, namely the three state-funded research institutes whose mission was educational research.

In the context of a shrinking discipline of educational sciences and a significantly increased competition for state funding of public research institutes due to German unification, public research institutes in the early 1990s were forced to look for ways to legitimise further research. Since educational research was the *raison d'être* for some of these institutes, their directors had to accept the request to participate in ILSA studies. As a consequence, some researchers in these institutes were effectively forced to drop their previous research and to move to ILSA studies.

German researchers did not just administer their parts of the international studies but also actively engaged in the methodological work at the international level and thus began to play important roles in the international development (including the provision of data analysis services).

> And simultaneously it happened that I was proposed to join the international expert group at OECD or ACER (…). It was important from a German point of view to sit in the first row and to participate in test development and to ensure the test quality, to get involved in international discussions. These expert groups were relatively small, about seven or eight people who came from different countries.

The move of researchers to ILSA studies was expensive and bore significant reputational risks. The material costs of ILSA research were, however, easily met due to its location at state institutes (see Gläser et al., this volume) and the political interest in these studies.

German ILSA researchers managed to exploit the new political interest for extending the collection of data beyond those required for the international comparison. They enlarged national samples of ILSA studies in order to obtain robust data for intra-country comparisons, which are of special interest in Germany due to the federal states' authority over

education. In the context of PISA, the sample was extended to 44,000 students, which made comparisons between federal states possible, and was considered a breakthrough by educational researchers.

LSA researchers also constructed national longitudinal studies around international LSA studies. These data, which trace educational attainment of the same students in several subsequent years, are generally considered to be much more useful for educational research than the cross-sectional data produced by ILSA studies. Similar to their Swiss colleagues, German researchers turned TIMSS in a longitudinal study.

> We did TIMSS as a longitudinal study. We started one year before, took a new sample that was untouched for the international comparison (…). We were the only country that added a longitudinal design from the beginning. We had observation data, we had video data in comparison to Japan and the U.S. (…). The international organisation of the study was not interesting for me.

The use of data emerged slowly with the accumulation of data from subsequent international studies. The federal structure of the German educational system, which has 16 different educational systems under the control of the federal states, enables the replication of ILSA-type questions at the national level.

Access to the ILSA data and publication of results remain difficult for some researchers because some of the questions about differential educational attainment in Germany are considered politically sensitive, and either access to data or publication of results is hindered by the state. The 'PISA shock' – the perception that German student achievements are, on average, far worse than previously assumed – created an intense political debate about the causes of these results. Neither all of these causes nor all the causes of differences within Germany – between education systems of the federal states – are open to educational research at the moment. Some researchers who want to investigate specific questions in that context find themselves barred from access to the necessary data.

Parallel to the slowly growing use of ILSA data, an interest in longitudinal data emerged. More recently, the interest in longitudinal data led to the institutionalisation of a large national longitudinal study, the so-called national educational panel study (NEPS). In the context of these developments, many researchers changed their research practices to the production of LSA-style data.

When German educational policy-makers decided to participate in the 'new' ILSA studies, administering the studies bore significant reputational risks for researcher. It was not clear at all whether an academic career

in educational science was possible on the basis of ILSA research. There were no positions at German universities for ILSA researchers, and the hostility of traditional educational scientists towards ILSA studies made it seem unlikely that professorships would be given to ILSA researchers.

However, the German ILSA researchers were able to transform the reawakened political interest into political and financial support for quantitative empirical research beyond the immediate contribution to international studies. The researchers at public research institutes who moved into the field of ILSA studies were originally not particularly interested in this research but recognised the research opportunities created by the political interest and the absence of competition. The federal states had no departments of their own that could produce independent scientific data as input for governance. Nor were there nearly enough researchers at universities who would or could meet this demand.

Participation in international studies and accompanying national studies let quantitative educational studies emerge as a separate subfield of education research in Germany. The large research programme, which was guaranteed through the periodic cycles of international studies and the continuous commitment of political actors, created many well-funded positions for research and training. Soon, researchers participating in the international studies could earn reputations within a multi-disciplinary field of educational science, sociology, and psychology. The states also began to initiate the institutionalisation of quantitative empirical education research at German universities.

Owing to the specific methodological knowledge that was required for conducting ILSA studies, none of the educational researchers in the hermeneutic tradition moved to quantitative studies. Instead, researchers from psychology, economics and sociology migrated to the new field. The conceptual and epistemological differences between traditional and 'new' education researchers remained and led to a split of the professional association. In 2012, quantitative educational researchers founded their own professional association, the Association for Empirical Education Research.

EXPLAINING COMMONALITIES AND DIFFERENCES IN NATIONAL RESPONSES TO ILSA STUDIES

The comparison of the four cases shows that the factors most important to the other innovations discussed in this volume – access to resources and

reputational risks – didn't make a difference to the development of ILSA studies in the four countries. The strongest authoritative agencies, which shaped the emergence and persistence of ILSA studies in all four countries, were the states and their interest in monitoring, comparing and improving their education systems, and the international agencies and their expert panels, which determined what was done, when it was done and how it was done. This basic authority structure did not vary between the four countries.

The interest of the state in participating was strong enough to secure that administering the survey and providing reports was sufficiently financed, and researchers were funded for each study. In the Netherlands and Switzerland, the administration of surveys was occasionally outsourced to non-research units, which emphasises the routine character of this task. Access to resources was secure, and conducting the new ILSA studies involved no reputational risks for Dutch, Swedish or Swiss researchers.

The organisation of authority relations made a difference only in Germany, where the first groups to conduct ILSA studies were 'sheltered' in public research institutes, which protected them from their community's antagonism. The political interest in ILSA studies led to continuous funding, which created positions and career opportunities, and finally led to the emergence of a community.

The involvement of a country's educational scientists in ILSA studies before 1990 also made little difference. In the three countries involved with setting up ILSA studies (the Netherlands, Sweden and to some extent Germany), this tradition lapsed prior to the new ILSA studies.

Most of the commonalities and differences of responses by the four different educational science communities can be explained by nationally specific relationships between the nature of the stimulus – the new ILSA studies – and the national epistemic context in which it operates (Table 3).

The four national educational science fields vary considerably in their thematic composition and methodological research traditions, which made the new ILSA studies arrive in different contexts. Three of the four countries had quantitative research traditions that addressed research questions similar to those asked by ILSA studies. Dutch, Swedish and Swiss educational researchers were all interested in the effects of their educational systems on achievement to some extent, and addressed these questions by quantitative approaches. Although quantitative research receded in Sweden and never was a dominant approach in Switzerland, it was legitimate in all three countries and provided some fertile ground for the new ILSA studies. Only German educational science was dominated

Table 3. Relationship between New ILSA Studies and Educational Research in the Four Countries.

	Netherlands	Sweden	Switzerland	Germany
Epistemic traditions on which ILSA could build	School effectiveness research	Efficiency of the national education system	Effects of educational processes	None
Strength of quantitative research in the early 1990s	Strong	Limited	Limited	Very weak
Involvement in developing the ILSA methodology	No	Yes	No	Yes
Additional data production linked to ILSA studies	None	Additional items in ILSA surveys, qualitative data	Qualitative and longitudinal data, expansion of ILSA samples	Qualitative and longitudinal data, expansion of ILSA samples
Research building on ILSA studies	Few secondary analyses (international comparisons)	Mainly methodological, few secondary analyses	Mainly critically methodological, few secondary analyses	Methodological and few secondary analyses
Reasons for limited use of ILSA data	Time constraints for data producers, initially little funding for secondary analyses, own longitudinal data fit research questions better, little interest in international comparison	Time constraints for data producers, initially little funding for secondary analyses, insufficient methodological knowledge of other researchers	Limited access to data until 2008, data don't fit research questions	Limited access to data, data don't fit research questions
Impact on educational science community	None	Strengthening of quantitative research tradition	Strengthening of quantitative research tradition	Emergence of quantitative educational research community

by hermeneutic approaches, and was at the same time hostile to quantitative educational research. As a consequence, ILSA studies were effectively established outside the dominant educational science community.

Regardless of compatible traditions in three countries and a rapidly growing community in the fourth, the new ILSA studies don't appear to be well embedded in educational science research. Researchers in Sweden added questions to the survey, and German and Swiss researchers enlarged the sample in order to support comparisons between the educational systems of federal states. German and Swiss researchers complemented the first new ILSA study (TIMSS) by qualitative data, and turned it into a national longitudinal study. The research accompanying the new ILSA studies is mainly methodological. The use of ILSA data for educational research beyond the delivery of policy reports has started with considerable delays and keeps growing slowly but steadily in all four countries, least so in the Netherlands.

Our interviews revealed several interesting reasons why ILSA data appear to be difficult to use. The first reason is time. It was clearly stated in the Netherlands and Sweden that one can either administer the national survey for an ILSA study or use the data for research because administering the national survey is a very time-consuming task that consists of much routine work. While state funding was sufficient for data collection and analyses for policy reports in all four countries, it did not cover secondary analyses for scientific purposes. Funding for secondary analyses emerged with considerable delays in all four countries.

This dilemma impedes secondary analyses because ILSA data are quite complex and difficult to understand, and having produced them best provides the necessary understanding. This is why those who conduct the national studies also were those best placed to use the data. At the same time, there is little overlap between producers and users of the data in all four countries.

Secondary analyses of ILSA data are also made unattractive by the lack of control of data collection. The content, methodology and outcomes of ILSA studies are largely decided by the panels of international experts which plan and administer the studies for either the IEA or the OECD. Consequently, it doesn't matter at all who administers the national studies as long as the rules set up by the international leaders are followed. Data collection is a routine task that can equally be conducted by state bureaucracies or education researchers. This emphasis on the international comparability of data maximises political use but ignores possible limitations to scientific use.

This was an issue for Dutch researchers who tried to include variables but did not succeed. In Sweden and Switzerland this wasn't even tried, and German educational researchers actively participated in the methods development but did not attempt to change the variables. The only opportunity researchers had was including additional questions in their national surveys, which made international comparisons – the main purpose of new ILSA studies – impossible. As a result, ILSA data are likely to slightly mismatch most research questions, and compete with data produced by the researchers themselves, that is data that were controlled and fully understood by those who analyse them, in countries with a national tradition in educational research.

The limited interest of educational science communities in international comparisons is yet another reason why ILSA data are used only reluctantly. Participation in ILSA studies has not changed the fact that educational research has a strong national orientation, which makes international comparisons a marginal research theme. The countries with internally differentiated education systems (Switzerland and Germany) can conduct internal 'ILSA-style' comparisons within national boundaries. However, these comparisons are also mainly of political interest. Beyond these comparisons in federally organised countries, few researchers appear to use data from other countries at all.

Another important property of ILSA data that limits their use for educational research has surfaced in all four cases. ILSA data are cross-sectional rather than longitudinal, which serves their political purpose of international benchmarking but makes them less suitable for research purposes. Educational researchers consider longitudinal data necessary for answering their research questions. This makes ILSA data 'bad' data, as Dutch researchers who have their own longitudinal data clearly stated. The attempts by German researchers to make the TIMSS data part of a longitudinal study and the recent initiatives of the now-established German community to create national longitudinal data reflect the same problem. Swiss education researchers responded to this problem by adding a longitudinal study to the first PISA survey. Another, more indirect sign of the unsuitability of ILSA data for educational research is the large proportion of ILSA-related research that uses the data to answer methodological rather than substantial questions (the methodological research on the validity of ILSA studies in Sweden) or occurs outside the core educational science, for example as sociological research into inequality in the Netherlands, Switzerland and Germany.

Finally, it appears that ILSA data need to exist for some time before approaches to using them are developed. These data do, after all, constitute a new empirical research object that competes with those researchers already have established. The research opportunities need to be discovered, which will be done by new generations of researchers. After the 'new ILSA studies' began in the early 1990s, we finally observe a rise in ILSA data use from the mid-2000s onwards. This indicates that educational research communities in all four countries – including the ILSA-driven and rapidly growing German community – needed to learn what can be done with data that were produced first and foremost for political purposes. The slow growth of the use of ILSA data also indicates a diffusion process. It might turn out that ILSA data have their more innovative uses not within educational research but in neighbouring fields such as the sociology of inequality – which might in turn change the composition of the complex field of educational research.

These difficulties to link educational research to the new ILSA studies explain their differential impact on national educational science communities. This impact is negligible in the Netherlands because Dutch educational researchers continue their nationally oriented quantitative research with their own data, which they consider superior. In Sweden and Switzerland, the new ILSA studies strengthened the quantitative research tradition that was already there. In Germany, where no tradition existed that was compatible with the new ILSA studies, the introduction of ILSA studies due to state interest kick-started the growth of a quantitative educational science community. State-funded research institutes and large amounts of funding temporarily protected new quantitative researchers from the authority of their national community. Having grown and become firmly institutionalised, the new community now appears to be turning towards more interesting things than administering and analysing the new ILSA studies.

CONCLUSIONS: TENSIONS BETWEEN SERVICE DELIVERY AND ENDOGENOUS RESEARCH DYNAMICS

The new ILSA studies that were conducted from the beginning of the 1990s provided us with a quasi-experiment. Four different science systems received the same stimulus of exactly the same type of empirical study.

The 'intervention' of new ILSA studies was exogenous to the four national scientific communities in several respects. They did not emerge from the research of any of the national communities even though the general topic addressed by it was established in three of them. The protocol of data collection was non-negotiable and could only be added to by national educational science communities. The studies applied a new methodology that enabled reliable international comparisons of student achievement, and educational policy-makers in the four countries were interested in the results and made available the necessary resources for conducting them.

It is important to keep in mind that the 'panels of international experts' directed these internationally comparative studies in the absence of an international scientific community with common research priorities. While all four countries had or have leading researchers who were members of international expert groups or organisations and promoted the participation in ILSA studies in their countries, there is little indication in our four case studies of a set of shared scientific problems that guides ILSA studies. Instead, these studies owe their existence to a political interest in comparing student achievements. The international experts leading ILSA studies appear to be an international group of members of national elites rather than the elite of an international community.

The new ILSA studies thus were exogenous to the four national educational science communities in two respects. They were epistemically decoupled from educational research in the four countries and they were driven by external (political) interests. This situation provided us with the opportunity to identify the factors responsible for the different responses to this stimulus in the four countries. The analysis of authority relations between international agencies, national policy interests and scientific communities, on the one hand, and national epistemic traditions of educational research, on the other hand, enables the following four conclusions.

First, the impact of any scientific innovation on a national scientific community strongly depends on its compatibility with national research traditions (for the same point, see the contributions to this volume by Laudel et al.; Engwall et al.; and Benninghoff et al.). In the case of new ILSA studies, the impact was strong in the country that didn't have compatible traditions (Germany) and much weaker (Sweden and Switzerland) or absent (Netherlands) in countries that had research traditions asking compatible questions and using compatible methods. In these latter countries, certain research traditions were strengthened, while in Germany a whole new community of quantitative educational researchers emerged.

This pattern is exactly the opposite of what has been observed in the other RHESI case studies. It also is somewhat counter-intuitive because one could expect a stronger impact on fields with a smaller epistemic distance to the innovation. This leads us to a second conclusion, namely that the development of an innovation crucially depends on the research opportunities it offers (a point that has been made by Pickering, 1980 for the choice between theories). The new ILSA studies differ from the other innovations discussed in this volume in this respect because they had little to offer to educational researchers. Modifications of the data collection protocol were strongly limited to additional questions in national contexts and enlargements of the national samples. Secondary analyses of the data were limited by time constraints for those who produced the data, methodological difficulties for others and, more generally, by the nature of the data. Cross-sectional data were of no use for educational research communities whose research traditions generated questions that can only be answered with longitudinal data.

The third conclusion is therefore that political interest and funding can generate scientific services but are not sufficient to establish scientific innovations. This argument has a long tradition in science studies, possibly beginning with Polanyi (1962), reinforced by empirical studies on 'planned research' in the 1970s (Van den Daele, Krohn, & Weingart, 1979), and applied to the analysis of research councils as intermediary organisations (Braun, 1998).

The demand for services is not inconsequential, though. Services provided by a scientific community may strengthen lines of research that can be meaningfully linked to the service, as is illustrated by the strengthening of quantitative research traditions in Sweden and Switzerland. The German example demonstrates that state interest can be utilised by researchers to further their own research and professional agendas, and how far this utilisation can go. Germany owes the new ILSA studies the emergence of a whole new research community, and the emergence of a quantitative research tradition in educational science.

The case of ILSA studies thus demonstrates the limited impact of external authority on the endogenous dynamics of research fields. One of the more surprising findings of our research is the slow pace at which data that are produced with immense efforts are used for educational research. This leads us to our fourth conclusion. Having defined a scientific innovation as a research finding that affects the practices of many researchers in a field, it seems doubtful that the new ILSA studies constitute such an innovation at all. A significant impact could be observed only in Germany, where the

emergence of a quantitative educational science tradition can be considered as such a wide-ranging change of research practices. But even in Germany one could ask whether it was a research finding that brought about the change of practices. The process can be better understood as institutional entrepreneurs exploiting a state request for professional service for building their own research community.

The use of ILSA data is nevertheless growing in all four countries, which suggests that the scientific impact of new ILSA studies on educational science communities still lies ahead, and that innovations in the social science and humanities are developed more slowly, not least due to the varying national research traditions (see also Engwall et al. in this volume on an innovation in the humanities). The slowly but inexorably growing use of ILSA data for genuine educational research and research in adjoining fields as well as the growing support for this research by the scientific communities demonstrates that a scientific community will respond to the emergence of a new research object (however awkward) – but at its own pace.

NOTE

1. All quotes are from interviews with education researchers from the four countries. Interviews with Dutch researchers were conducted in English, quotes from Swedish, Swiss and German researchers are our translations.

REFERENCES

Braun, D. (1998). The role of funding agencies in the cognitive development of science. *Research Policy*, *27*(8), 807–821.

Creemers, B. P. M., & Scheerens, J. (1994). Developments in the educational effectiveness research programme. *International Journal of Educational Research*, *21*, 125–140.

Ditton, H. (2009). Familie und Schule: Eine Bestandsaufnahme der bildungssoziologischen Schuleffektforschung von James S. Coleman bis heute. In R. Becker (Ed.), *Lehrbuch der Bildungssoziologie* (pp. 239–256). Wiesbaden: VS Verlag für Sozialwissenschaften.

Dronkers, J., & Robert, P. (2008). Differences in scholastic achievement of public, private government-dependent, and private independent school: A cross-national analysis. *Educational Policy*, *22*, 541–577.

Forsberg, E., & Lindberg, V. (2010). *Svensk forskning om bedömning – en kartläggning*. The National Research Council Report, 2.

Gretler, A. (2000). Die schweizerische Bildungsforschung der Nachkriegszeit im Spiegel ihrer Institutionen und ihrer Themen – von der Geschichte zu aktuellen Fragestellungen. *Schweizerische Zeitschrift für Bildungswissenschaften*, *22*, 111–144.

Grisay, A., & Griffin, P. (2006). What are the main cross-national studies? In N. K. Ross & I. Jürgens-Genevois (Eds.), *Crossnational studies of quality of education: Planning their design and managing their impact* (pp. 67–102). Paris: UNESCO Institute for Educational Planning.

Hansen, M., & Lindblad, S. (2010). *Om forskningskommunikation och publiceringsmönster inom utbildningsvetenskap – en studie av svensk utbildningsvetenskaplig forskning vid tre lärosäten*. The National Research Council Report, 10.

Keeves, J. P., & Lietz, P. (2011). The Relationship of IEA to some developments in educational research methodology and measurement during the years from 1962 to 1992. In C. Papanastasiou, T. Plomp, & E. C. Papanastasiou (Eds.), *IEA 1958–2008: 50 years of experiences and memories* (pp. 217–252). Nicosia: Cultural Center of the Kykkos Monastery.

Kuyper, H., & van der Werf, G. (2012). *Excellente leerlingen in het voortgezet onderwijs. Schoolloopbanen, risicofactoren en keuzen*. GION: Universiteit Groningen.

Luukkonen, T., Persson, O., & Sivertsen, G. (1992). Understanding patterns of international scientific collaboration. *Science, Technology, & Human Values*, *17*, 101–126.

Mayntz, R. (2001). *Die Bestimmung von Forschungsthemen in Max-Planck-Instituten im Spannungsfeld wissenschaftlicher und ausserwissenschaftlicher Interessen: Ein Forschungsbericht*. Köln: Max-Planck-Institut für Gesellschaftsforschung.

Pickering, A. (1980). The role of interests in high-energy physics: The choice between charm and colour. In K. D. Knorr, R. Krohn, & R. Whitley (Eds.), *The social process of scientific investigation* (pp. 107–138). Dordrecht: Reidel.

Polanyi, M. (1962). The republic of science. *Minerva*, *1*, 54–73.

Reguant, S., & Casadella, J. (1994). English as Lingua Franca in geological scientific publications – a bibliometric analysis. *Scientometrics*, *29*, 335–351.

Van den Daele, W., Krohn, W., & Weingart, P. (Eds.). (1979). *Geplante Forschung: Vergleichende Studien über den Einfluß politischer Programme auf die Wissenschaftsentwicklung*. Frankfurt/Main: Suhrkamp.