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The Research Project ILLEV (Innovative Teach-Study-Network in Academic Higher Education)

- **A Short Summary of the Main Results**

IMPRINT

Happ, Roland; Zlatkin-Troitschanskaia, Olga; Förster, Manuel; Preuße, Daja; Kuhn, Christiane; & Schmidt, Susanne (2013):

The Research Project ILLEV (Innovative Teach-Study-Network in Academic Higher Education) – A Short Summary of the Main Results

Published by:

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– A Short Summary of the Main Results

Contents

Contents1

1 Introduction and State of the Research2

2 Aims, Theoretical Background, and Research Questions3

3 Research Design2

4 Instruments Employed5

5 Key Results in Relation to the Main Research Questions7

6 Outlook13

Bibliography17

Index of Abbreviations I

Published to DateII

1 Introduction and State of the Research

There has been a considerable amount of spirited public dialog about the Bologna Declaration (Nickel, 2011); however, this largely controversial discussion has rather normative characteristics. Indeed, the effects of the Bologna Reform still lack empirical proof (cf. Zlatkin-Troitschanskaia, Förster & Happ, 2012). The crucial role of professionalization in a knowledge-based society is undisputed; however, the current state of research provides very little empirical evidence on the influence of academic higher education on the development of professionalism in students (Blömeke, Zlatkin-Troitschanskaia, Kuhn & Fege, 2013). In the course of the reform of the higher education systems in Europe (Bologna Declaration) this issue has become increasingly important. The many actions taken in Germany in response to the Programme for International Student Assessment (PISA) debacle in school education have given cause for hope for similar empirical research in higher education (cf. Kuhn & Zlatkin-Troitschanskaia, 2011; Blömeke, Zlatkin-Troitschanskaia, Kuhn & Fege, 2013). So far, however, neither the effects of the discontinued Diplom study model nor those of the newly implemented Bachelor/Master model are known sufficiently on the German and European levels. A major reason is the lack of adequate theoretical models and reliable instruments for measuring professional competencies among students (cf. Kuhn & Zlatkin-Troitschanskaia, 2011).

Therefore, in the ILLEV project financed by Germany's Federal Ministry of Education and Research (BMBF) (grant no. 01PH08013), the effects of the different study models on student professionalism and professionalization and their levels and development in the domain of business and economics are compared (cf. Zlatkin-Troitschanskaia, Förster & Happ, 2012). ILLEV is one of the few projects of the BMBF funding program "University Research as a Contribution to Professionalizing Higher Education" that also focuses on modeling and measuring subject-specific content knowledge and pedagogical content knowledge, especially among students of business and economics and business education,¹ while controlling other relevant variables such as dimensions of intelligence, motivation, epistemological beliefs, and sociodemographic parameters (cf. Förster & Zlatkin-Troitschanskaia, 2010). In a longitudinal study, Diplom and Bachelor/Master students of business education and business and economics (n = approx. 3.200) were accompanied and surveyed over four years (fall 2008, 2009, 2010, 2011) regarding their level of business and economic content knowledge and, in particular, their development of content knowledge was analyzed (cf. Happ, 2013, Schmidt in preparation). Existing validated tests (cf. the Test of Economic Literacy by Soper & Walstad, 1987 or the Business Administration Knowledge Test by Bothe, Wilhelm & Beck, 2007) were used to assess content knowledge in business and economics. Another component of the project was the assessment of pedagogical content knowledge in the domain of business and economics for which the ILLEV project team was able to draw on several test items from Kuhn's instrument, at the time still under development and testing (2013, BMBF-funded dissertation project, grant no. 01JG0928).

¹ For further information on this BMBF funding program s. <http://www.hochschulforschung-bmbf.de/de/1312.php>

This article begins with a short overview of the basic aims, theoretical background, and research questions of the ILLEV project then moves on to the research design and the test instruments employed. Further on, the main findings of the ILLEV project are described and the results are outlined according to their relevance to the key research questions. For further and more detailed analyses, please refer to the existing publications within the project (e.g., for further comparative analyses and information on test validity, cf. Förster, Happ & Zlatkin-Troitschanskaia, 2012; for further analyses on the effects of the Bologna Reform, cf. Zlatkin-Troitschanskaia, Förster & Happ, 2012; and for further analyses of the relationship between content knowledge and pedagogical content knowledge in the domain of business and economics, cf. Kuhn, Happ et al., 2013).

2 Aims, Theoretical Background, and Research Questions

The ILLEV project (Innovative Teach-Study-Network in Academic Higher Education, cf. www.wipaed.uni-mainz.de/illev/) makes use of the historically unique situation of being an almost natural experiment in which the degree programs of the traditional study model and the new consecutive study model coexist (cf. Zlatkin-Troitschanskaia, Förster & Kuhn, 2013). During the project, a comparison was made of the old Diplom model and the new Bachelor/Master model in business and economics and in business education regarding their effects on the level and development of student professionalism over the course of four years. The reference analyses allow empirically based statements to be made regarding the question of whether the new consecutive Bachelor/Master model contributes to higher professionalism. In this context, professionalism is seen as being a result of individual personal factors and structural factors in the respective study model (cf. Zlatkin-Troitschanskaia, Förster & Happ, 2012). Personal factors include, for example, the students' school leaving grade and their motivation or intelligence, which might influence the development of content knowledge. An example of a structural factor is the number of lectures attended by the student in the particular study model (Bachelor/Master or Diploma).

The focus of the project is on modeling and measuring the cognitive dimensions of professionalism, that is, subject-specific content knowledge and pedagogical content knowledge in the domain of business and economics (Zlatkin-Troitschanskaia, Förster & Kuhn, 2013). The understanding of professional competence is based on the Klieme and Leutner (2006) definition in which they describe competence as a context-specific performance disposition. In the conceptualization of professional competence, this definition grants high importance to subject-specific knowledge and understanding (for further definitions of competence, cf. Baumert & Kunter, 2006; Bromme, 1997; Shulman, 1986, 1987; Weinert, 2001).

The structural factors assessed can be divided into the following three levels (cf. Buske, Förster et al., 2010):

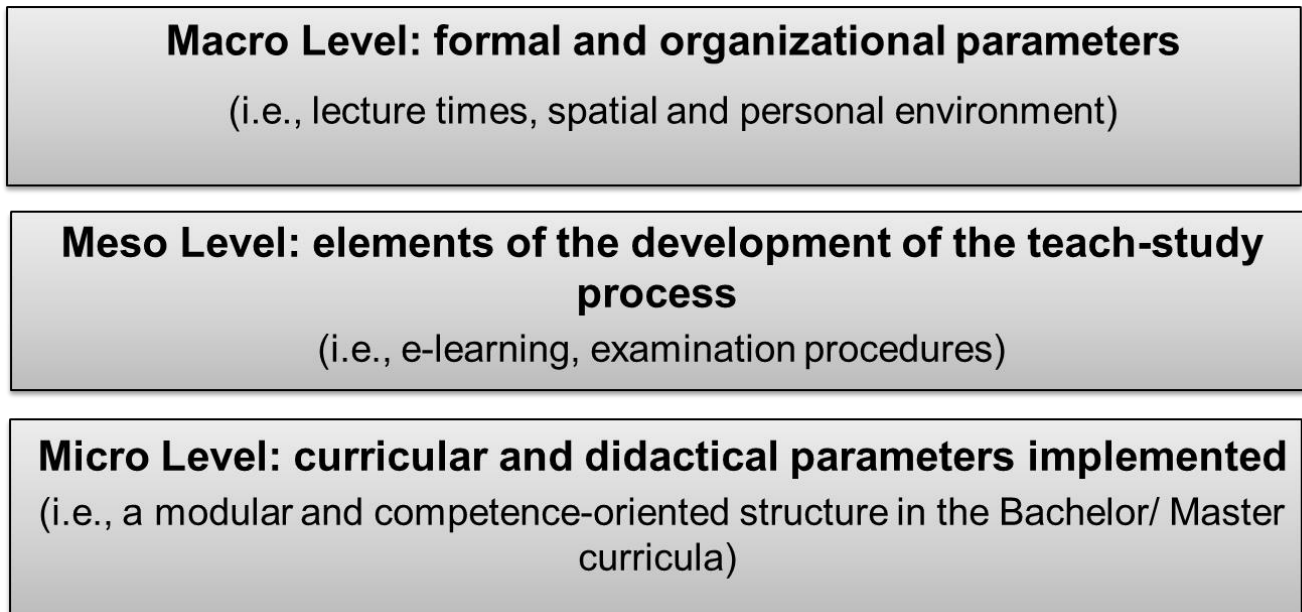


Figure 1: the macro, meso and micro levels in the ILLEV project

In the ILLEV project, the test instruments, the quantitative questionnaire surveys, the qualitative interviews, and the ensuing results presented below were all geared towards providing answers to the following *three research questions*:

1. To what extent do the old Diplom model and the new Bachelor/Master model (in business education and business and economics) influence the **level and development** of students' professional competence?
2. Which of the student's personal factors (e.g., school-leaving grade, intelligence, previous knowledge) and which of the degree course's structural factors (e.g., number of lessons in a study model) are significant influence variables?
3. Do the new Bachelor/Master model in business education and, in particular, the implementation of the Innovative Teach-Study-Network in the ILLEV project lead to higher professional competence in students of teaching (in comparison to the discontinued Diplom model)?

3 Research Design

To assess the development of professional competence among students of the new consecutive Bachelor/Master study model in business and economics (intervention group) over time, longitudinal surveys were conducted in four one-year intervals: fall 2008, 2009, 2010, and 2011 (cf. Happ, 2013). According to cohort design, two cohorts were identified and divided into individual study phases. Cohort 1 was surveyed at the beginning of university studies (t1), after the Bachelor orientation phase (t2), after the Bachelor specialization phase (t3), and at the end of the Bachelor degree program (t4). Cohort 2 was assessed after the Bachelor orientation phase (t1), after the Bachelor specialization phase (t2), at the end of the Bachelor degree pro-

gram (t3), and after the first phase of the Master program (t4) (cf. Zlatkin-Troitschanskaia, Förster & Kuhn, 2013). To allow for a systematic comparison of the traditional and the new consecutive study models, students in the Diplom degree program (length of study: eight semesters) (control group) were surveyed as well using the same test instruments and at the same four test dates (fall 2008, 2009, 2010, and 2011). This offered the opportunity for further longitudinal analyses (cf. Happ, 2013).

As well as business and economics students (Bachelor/Master and Diplom), business education students also were surveyed (Bachelor/Master and Diplom). This allowed statements to be made *inter alia* on whether the development of professional competence is the same among students with and students without a teaching perspective, or whether it is influenced by other structural or personal factors. A comparison of these subgroups is possible since the study content of business and economics is the same during the basic study period (Diplom) and the orientation and consolidation phases (Bachelor) of both the business and economics and the business education degree programs. Third, the University of Applied Sciences participated in the study, as well, at the last two measuring dates in 2010 and 2011 (s. figure 2); thus, a comparison of students from the University of Applied Sciences with students from the University also was possible (cf. Happ, Schmidt & Zlatkin-Troitschanskaia, 2013).

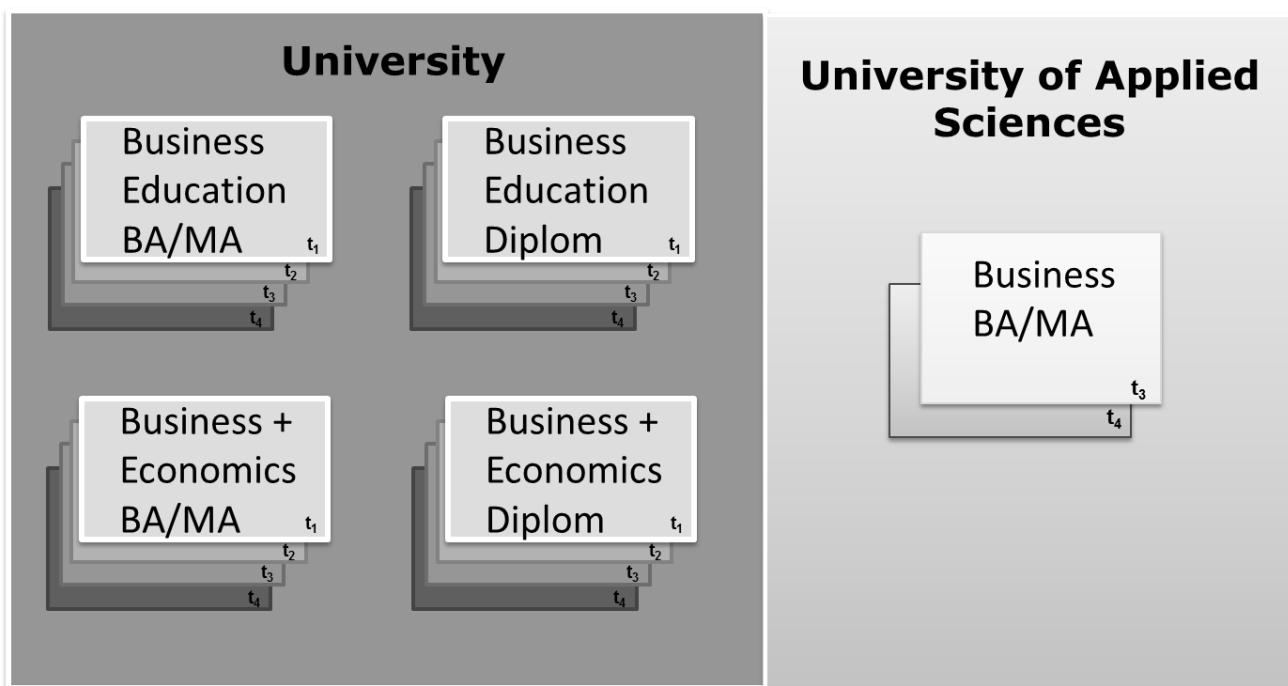


Figure 2: Comparison group design of the ILLEV project

Apart from comparisons between groups, insights were gained into the development of students' content knowledge and other factors (e.g., motivation, epistemological beliefs) especially with regard to structural equation modeling and the use of latent growth curve modeling (Bollen & Curran, 2006). Individual codes were generated at every point of assessment to ensure correct identification of the students tested (Happ, 2013). The total sample consisted of 901 students in fall 2008 (t1), 800 students in fall 2009 (t2), 1,243 students in fall 2010 (t3), and 1,289 students in fall 2011 (t4) (s. figure 3). Students were assessed with regard to

their business and economics competence, a number of personal traits (age, job experience, etc.), and various structural factors that can influence the development of professionalism positively or negatively. Thus, the ILLEV project can be characterized as a systematic longitudinal approach in the higher education sector.

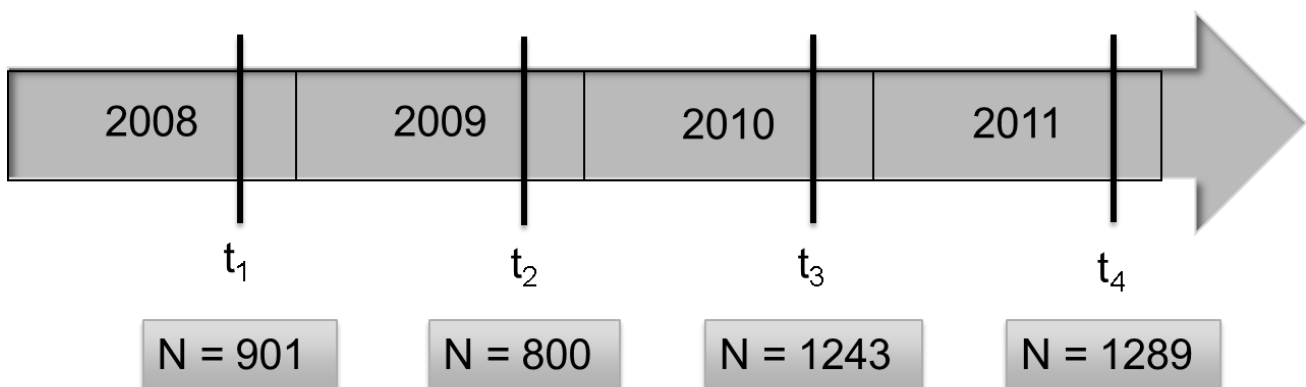


Figure 3: Longitudinal approach of the ILLEV project

Following the model of professional competence developed by Krauss et al. (2011), the survey responses allowed the assessment not only of content knowledge, but also of pedagogical content knowledge in the domain of business and economics (s. figure 4). In the ILLEV project, two methods were applied to assess pedagogical content knowledge. First, business education students were surveyed in an online questionnaire to identify key areas of pedagogical content knowledge that showed significant differences between students in the basic program and students in the advanced and specialized program (students of the former program had not yet attended classes on teaching methodology while students of the latter program had). The aim was to examine the development of professional competence within the newly-created Innovative Teach-Study-Network and within the regular curriculum. To assess pedagogical content knowledge, the project team was able to use some test items from Kuhn's instrument (2013, BMBF-funded dissertation project, grant no. 01JG0928). The online survey was completed by a total of 125 business education students (89 from the basic program, 36 from the advanced and specialized program). Second, the levels of development of pedagogical content knowledge in the domain of business and economics were analyzed in a more differentiated way by conducting guided interviews (Fuhs, 2007; Hopf, 2007) consisting of contemplating a lesson which the student had planned and conducted autonomously in the school subject of business/economics as part of a practical training session. The interviews addressed and reflected upon different features such as formulation of professional competence, relatedness of theory and practice, self-reflection, multiple learning paths, and many others.

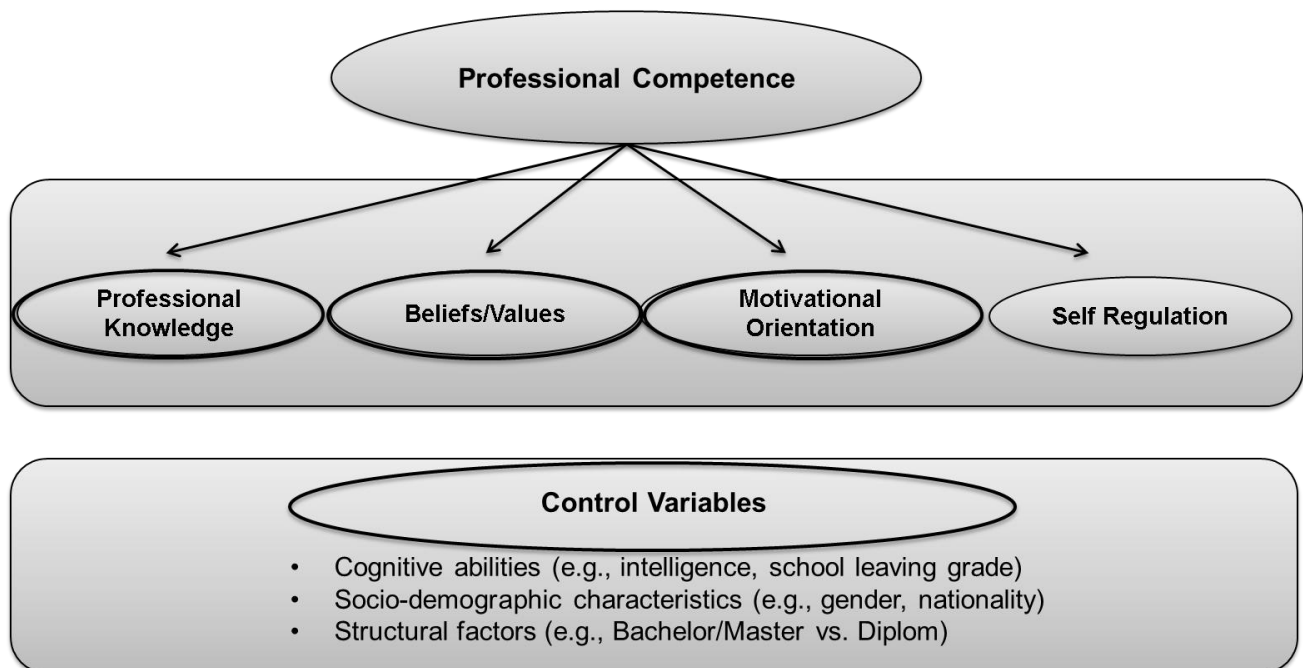


Figure 4: Modeling the professional competence of students in the ILLEV project (according to Krauss et al., 2011; Baumert & Kunter, 2006)

4 Instruments Employed

The survey instruments used were geared towards gaining results which would answer the ILLEV project's research questions (s. chapter three).

a) Content Knowledge in Business and Economics

To measure content knowledge in business and economics, two existing German language test instruments were applied and validated with regard to the curriculum: the WBT (Beck, Krumm & Dubs, 1998) and the Business Administration Knowledge Test (BAKT) (Bothe, Wilhelm & Beck, 2007).

The WBT is the German version of the English Test of Economic Literacy (TEL) adapted by Beck, Krumm & Dubs (1998). Soper and Walstad (1987) developed the TEL, which permits differentiation between relatively low and high development levels of economic knowledge and understanding. The translated test has been adopted in a number of German-speaking countries (Lüdecke-Plümer & Sczesny, 1998; Katschnig & Hanisch, 2005; Müller, Fürstenau & Witt, 2007, Rosendahl & Straka, 2011). The measurement features and quality factors of the WBT have been researched and validated for both versions - English and German - according to classical test theory (Beck & Krumm, 1990; Beck, Krumm & Dubs, 2001; Soper & Brenneke, 1981; Soper & Walstad, 1987); thus, the WBT is an adequate instrument to use in the assessment of economic knowledge and understanding. Beck, Krumm and Dubs (2001) recommend the use of the WBT, particularly in the field of vocational business training. The WBT was created for target groups with economic knowledge at one stage below the university level, although some questions are at university level (Beck, Krumm & Dubs, 1998). In the ILLEV project, an evaluation was made inter alia of whether the test can be used to measure professional

competence in higher education or is too easy for university students. Particular attention was paid to the possible occurrence of ceiling effects and the selectivity indexes of the items. Curricular validity of the test was reevaluated, as the test originally was designed based on high school and college curricula (cf. Förster, Happ & Zlatkin-Troitschanskaia, 2012). In the project, if and to what extent the test reflects economic contents taught at the university level was investigated (here: Bachelor/Master and Diplom).

The WBT consists of two parallel versions with 46 items each; 15 tie items allow comparison of the two versions. The items used can be divided into the four economic subdomains: basics of economics, international relations, microeconomics, and macroeconomics. Also, the items were arranged theoretically according to Bloom's cognitive levels (Beck, 1993; Soper, 1979). At the ILLEV project's first test date, a version of the WBT was used that contained 33 multiple choice items, each with one correct answer out of four options. Thus, the original version was cut back by 13 items as processing time had to be reduced for organizational and motivational reasons. To guarantee the curricular validity of the test, the curricula were analyzed, and lecturers to the relevant classes were surveyed. The items in the WBT were assessed according to their curricular relevance and difficulty. The subdomain of international relations was removed for curricular reasons (eight questions) because it is not a substantial part of Bachelor or Diplom basic studies in economic science or business and economics at the University of Mainz. The items used in the survey, which cover the three other domains, correspond well with the curriculum. After a statistical analysis, 19 of the 33 items used at measurement point 1 were retained for use at the following three measurement points (cf. Förster, Happ & Zlatkin-Troitschanskaia, 2012).

This cutback made it possible to include items from the BAKT in the surveys after the first measurement point. The BAKT was designed specifically for higher education and enables the assessment of students' content knowledge in business administration. The long version of the BAKT comprises 286 items in various business subdomains. For the ILLEV project, this test was cut back too, based on the results of lecturer interviews (cf. Zlatkin-Troitschanskaia, Förster & Happ, 2012). In the end, the ILLEV project included a selection of items from the subdomains of marketing, balancing, and human resources.

b) Motivational Orientation and Epistemological Beliefs

Two scales adapted from an existing questionnaire (Schiefele, Krapp, Wild & Winteler, 1993) and focusing on intrinsic and extrinsic motivation were used to assess students' reasons for choosing a business and economics degree program. High extrinsic motivation, for example, means the student expects to have a safe job and a good future income. In contrast, students with high intrinsic motivation choose business and economic programs because they believe the contents are important and will be enjoyable to learn (Schiefele & Schreyer, 1994).

In the model by Baumert and Kunter (2006), the section on beliefs and values includes various facets of knowledge such as value concepts, epistemological beliefs, and subjective theories (s. figure 4). In the ILLEV

project students' epistemological beliefs, which can be described as beliefs about the nature of knowledge (cf. Schommer, 1990), were investigated in particular. Epistemological beliefs include, for example, a person's subjective attitudes towards his or her chosen science or field of study. In ILLEV, this construct was assessed using a slightly modified version of the Objektivität des Wissens (objectivity of knowledge) scale by Schiefele and Moschner (1997).

c) Pedagogical Content Knowledge

According to the initial analysis of the research, no adequate instrument existed for the quantitative testing of pedagogical content knowledge in business and economics at the beginning of the ILLEV project; however, the project team was able to draw on several test items from Kuhn's instrument which at the time still was being developed and tested (2013, BMBF-funded dissertation project, grant no. 01JG0928). This way, single items could be employed, providing an early quantitative indication of the level and the development of pedagogical content knowledge. For a closer examination of how the Innovative Teach-Study-Network influences pedagogical content knowledge, the project team used qualitative approaches. The test instrument was modified to include an open-ended item related to the key topic "Criteria of good teaching in the domain of business and economics." Furthermore, guided interviews (cf. Mayring, 2008; Hopf, 2007) were conducted to reflect upon a lesson planned and carried out by the participant (Hascher & Wepf, 2007).

d) Control Variables and Socio Demographic Data

Apart from the items assessing content knowledge and pedagogical content knowledge (s. the theoretical model in figure 4), the test also contained subscales of the intelligence-structure test (IST: analogies and numeric tasks, Liepmann, Beauducel, Brocke & Amthauer, 2007; Amthauer, 1970). The subscales were verbal analogies and numerical series, which are indicators of verbal and numerical intelligence. Furthermore, the survey included a sociodemographic section to collect data such as age, gender, job experience, vocational training, and much more, and a further section to collect data on the structural framework conditions in the different study models such as kind and number of classes attended, among many others, which were recorded as structural influence factors (cf. Zlatkin-Troitschanskaia, Förster & Happ, 2012).

5 Key Results in Relation to the Main Research Questions

In the following, the project's key results will be outlined in relation to the main research questions (s. chapter 3) which were presented at the beginning of this article.

- **Influence of the Study Model (Bachelor/Master vs. Diplom) (Research Question 1)**

The first aspect of the study model that can be highlighted refers to how it influences content knowledge in business and economics. A comparison of the study models (Bachelor/Master vs. Diplom) shows slight to moderate effects in favor of Diplom students at all test dates. When other relevant influence factors were

controlled (such as the number of semesters attended), however, neither of the two study models (Bachelor/Master vs. Diplom) had a clear edge over the other in either test. The following results can be drawn from a regression on the sum score of the WBT and BAKT (s. tab. 1).²

Linear Regression Model	WBT (included)		BAKT (included)	
	R=0,438 R ² =0,192		R=0,432 R ² =0,186	
	B	Sig.	B	Sig.
(Absolute term)	10,152	,000	7,047	,000
Bachelor/Master degree program	-1,066	,748	-,426	,207
Female	-0,939	,000	-,658	,001
German mother tongue	,662	,032	1,096	,001
Semester	,198	,000	,174	,002
Completed vocational training	,569	,000	,489	,034
Analogy score	,204	,000	,218	,000
Mathematics score	,067	,003	,049	,031
School leaving grade	-,849	,000	-,748	,000

Tab. 1: regression on the sum score of the WBT and BAKT (beta coefficient and level of significance)

This finding from cross-sectional analyses was confirmed by longitudinal analyses. The second aspect to highlight is that when comparing the two study models with respect to students' development of content knowledge in business and economics, no significant differences were found that could be ascribed directly to the study model (Happ, 2013). These analyses with regard to the study model refer to the total sample, including business and economics and business education students.

Focusing only on the pedagogical content knowledge of business education students reveals differences between students attending the old Diplom model and the new Bachelor/Master model. Students attending the new study model show manifestly higher levels of pedagogical content knowledge (cf. Kuhn, Happ et al., 2013). An explanation for this significant finding is that Bachelor/Master studies are better coordinated with teacher training colleges within the Innovative Teach-Study-Network. This leads to the conclusion that the implementation of the Teach-Study-Network was a success.

² Here, for instance, the results at measurement point 2 are shown because both tests (WBT and BAKT) were conducted. At this measurement point there were no students from the University of Applied Sciences, which could have caused distortions. The sample included only students of business education and business and economics (Diplom and Bachelor/Master); students in minor fields of study were not included in the sample (N=654) reviewed in tab. 1 below.

- **A special view of the longitudinal analyses and the development of economics content knowledge (Question 1)**

In higher education research there is a lack of approaches to modeling and measuring the skills and knowledge of students in various fields of study – especially from a longitudinal perspective. This is true particularly in the field of business and economics (Zlatkin-Troitschanskaia & Kuhn, 2010). A comparison of the number of students across all fields of study (students enrolled per term) clearly shows that the field of business and economics is by far the most popular in Germany (Federal Statistical Office, 2012); however, as yet there is no model in the literature that explains how economic competence develops over the course of study and which individual personal and systemic structural influence factors are relevant to its development.

In the context of the Bologna Reform and the enormous changes associated with it (cf. Nickel, 2011), it would be of particular interest to know which competencies students acquire in the respective study models (Bachelor/Master vs. Diplom) and at which stages of study they acquire them. This information could be used to evaluate the change processes, which are primarily policy-driven, from an empirical point of view (cf. Happ, 2013) as well. Previous research targeting this objective has hinted at two major requirements for a research approach. First, the research questions should be investigated increasingly by means of diagnostic test-based methods that comply as much as possible with test quality criteria and not solely based on students' self-assessments (Nickolaus, 2010). In this respect, objective measurement methods offer very promising prospects, particularly for measuring cognition-related knowledge and skills (which also include economic competence). Second, for the purpose of interpreting how a given construct is influenced by different factors, cross-sectional approaches clearly are limited (Reinecke, 2005; Wild, 2011); therefore, longitudinal research designs are preferable (inter alia for analyzing cause-and-effect relationships).

In Germany, only a few approaches are geared towards operationalization and the measurement of economic competence (s. chapter 5). Among them, special mention should be made of the WBT economics education test. In addition, there is a range of studies that draw on test items from the WBT (cf. e.g., Müller, Fürstenau & Witt, 2007; Rosendahl & Straka, 2011); however, no study has been conducted in Germany at the university level in which the development of economic competence has been investigated in a longitudinal survey spanning several points in time. Given the very small number of empirical approaches, the national state of the research on operationalization, measurement, and particularly, the development of economic competence, still is unsatisfactory. On an international level there are slightly more approaches to measuring economic competence, albeit only a few employ longitudinal analyses. A noteworthy example of a test that can be used to assess economic knowledge is the above-mentioned TEL, adapted into the German language as the WBT. The TEL and the WBT have been used in a large number of international studies (cf. e.g., Kim, 1994; Gill & Gratton-Lavoie, 2011; Whitehead & Halil, 1991). Apart from the TEL, another notable test in the American English language area is the Test of Understanding in College Economics (TUCE). With respect to a longitudinal design, studies by Schuhmann, McGoldrick, and Burrus (2005) and by Walstad and Rebeck (2008) are

two of the few approaches used to measure the development of economic competence across two points in time. Even so, in view of both the national and the international state of the research, the case can be made that until today no systematic analysis of the development of students' economic competence over the course of their studies has existed. This observation was the starting point of the present study, thus, the longitudinal analyses address the following key question (cf. Happ, 2013):

How does the economic competence of business education students and business and economics students develop over the course of their studies?

This research question can be subdivided into a range of more specific sub-questions which will be presented in the following. In business and economics programs in particular, students have varying levels of knowledge at the beginning of their studies. They may have completed vocational training or attended an advanced course or two in business and economics at school, to name only two of many possibilities. For this reason, the following question needs to be investigated: To what extent does a **student's previous knowledge** influence the development of his or her knowledge during higher level studies? Furthermore, and particularly since the initiation of the Bologna Reform, the student body has been described as an extremely heterogeneous group (Happ, Zlatkin-Troitschanskaia & Förster, 2012), thus, it is important to know the relevance of influences that already have shaped students prior to the beginning of their studies. Another question which requires study is this: Which **personal factors** (mother tongue, gender, school leaving degree, intelligence, etc.) have a decisive influence on knowledge development over the course of the studies? In the current public debate in Germany, the discussion often turns to **structural influence factors** such as differences between the Bachelor/Master and the Diplom study models. From the perspective of empirical educational research, we urgently need to examine these policy-driven change processes in detail and evaluate them in light of the empirical results. Thus, the question arises: To what extent is a student's knowledge development influenced, in particular, by structural factors such as study model and degree program, among others?

Furthermore, it is likely that students develop differently over the course of their studies (partly due to personal preconditions). This assumption leads to the last sub-question: In what ways does the development process differ among students? Based on the knowledge development measured and the explanatory model, we finally can draw conclusions about competence development which might contribute to the optimization of university teaching.

The students generated individual codes during the survey. This enabled the test subjects to be re-identified and formed the basis of the systematic longitudinal analyses. As was to be expected, data collection in the higher education sector of this project was subject to high panel mortality – a common problem in higher education research (Heublein, Schmelzer, & Sommer, 2008). Therefore, it was a key requirement that the data analysis be based on a statistical method as robust as possible to avoid missing values in the longitudinal data set. Multi-level models enable changes to be measured on the basis of hierarchical linear models (cf.

Happ, 2013) and, thus, are suitable for this purpose. A major advantage of computing change histories using hierarchical linear models lies in the high level of flexibility (Klauer, 2009). This approach is promising, especially in view of the sample available. The method allowed for variation in both the dates and the frequency at which students participated in the survey. In addition, hierarchical linear modeling offered the opportunity to integrate covariates (influence factors) that it was thought might provide an explanation for interindividual differences among students. The opportunity to integrate various influence factors also made it possible to answer the sub-questions in this study (cf. Happ, 2013).

After the completion of the theoretical modeling and the fourth survey (winter term 2011/2012), the data set, containing data from a total of 3,210 students, was prepared systematically to single out those students who participated multiple times, that is, at least at two of the four survey measurement dates (cf. Happ, 2013). The first step in the analysis was to determine, with the help of the software Mplus, to what extent the WBT items in the survey indicated a one-dimensional structure of economic competence (cf. Muthén & Muthén, 1998-2012). The results of this step also were used to add up the items to form a sum score (cf. Happ, 2013). The score then was analyzed longitudinally using the software STATA (cf. Rabe-Hesketh & Skrondal, 2012). In the applied multi-level model of the development of economic competence, the longitudinal analysis revealed a significant result for a cubic model which includes a linear, a square, and a cubic term of time (cf. Happ, 2013). Influence factors found to be relevant were the gender, mother tongue, intelligence, and previous knowledge of the students. Further analyses remain to be conducted; however, we can draw conclusions for the development of theory and the optimization of higher education practice.

- **Influence of Individual and Further Structural Influence Factors (Research Question 2)**

Sociocultural Factors

Studies in the area of schooling (e.g., PISA) show that there are strong selection processes in education until the qualification to enter higher education is earned. At all measuring points in the ILLEV project, the student data showed no indication that such selection processes continue to exist in higher education. This was confirmed by longitudinal analyses of content knowledge, which also gave no indication that the parents' educational backgrounds significantly influenced the students' knowledge development (cf. Happ, 2013). We can summarize that the parents' educational levels apparently have no significant influence on students' content knowledge. In addition, the findings indicated neither positive nor negative discrimination among university students based on their social background. In contrast, strong selection processes exist in education up to graduation from high school. Thus, the sample contained a disproportionately high number of students whose parents were university graduates. There are relevant differences with regard to the comparison of study models (Bachelor/Master vs. Diplom): students in the new Bachelor/Master model more often come from well-educated families than their peers in the old Diplom study model (cf. Happ, Zlatkin-Troitschanskaia & Förster, 2012).

Individual Preconditions and Classes Attended

Furthermore, the ILLEV project provided evidence that those students who have less favorable entrance qualifications and, thus, less favorable preconditions for learning (measured via school leaving grade and cognitive abilities; Liepmann et al., 2007) also show a lower level of content knowledge in business and economics (cf. in tab. 1 for the cross-sectional analyses or in Happ (2013) for the longitudinal analyses). Even though the data shows that content knowledge in business and economics also is influenced significantly by the classes attended at university, especially by the basic courses (such as micro or macroeconomics), ultimately studying at university cannot offset less favorable preconditions for learning over the duration of the studies (cf. Happ, 2013).

Gender Effects

An additional finding is that at all four test dates the level of content knowledge in business and economics differed significantly between male and female students. Male students achieved significantly higher scores than female students, even when further relevant influence factors were controlled (s. tab. 1). These results confirm the findings of other studies on general or specific content knowledge (cf. Beck, Krumm & Dubs, 1998; Soper & Walstad, 1987). Given that performance tests gain increasing relevance, especially as entrance qualifications to degree programs in higher education, these findings indicate a lack of equal opportunity. The ILLEV project research team only marginally could examine the effects of the question/answer format as a possible technical cause because this was not related to the purpose of the study; however, the team considers this to be an aspect worth investigating more closely in follow-up studies (Förster, Happ & Zlatkin-Troitschanskaia, 2012). Equality of opportunity was one of the stated objectives of the Bologna Reform (Bologna Declaration, 1999). In particular, with regard to performance tests used, for example, as entrance qualifications, it is essential to discuss and formulate strategies to avoid systematic discrimination against female students (Zlatkin-Troitschanskaia, Förster & Happ, 2012).

- **Improving Professionalization by Implementing the Innovative Teach-Study-Network (Research Question 3)**

An essential aim of the newly-implemented Innovative Teach-Study-Network is to contribute to better learning conditions for business education students through better coordination of the training institutions (universities, schools, and teacher training colleges) involved within the framework of the modularized Bachelor/Master study model. Therefore, it is relevant to know at this point whether the implementation of the Innovative Teach-Study-Network has had any observable effects on the professionalization of students.

All in all, the implementation of the Innovative Teach-Study-Network has had positive effects on the development of professionalism among teaching students in the domain of business and economics.

- First, the introduction of e-learning software and also of computer-based examinations led to a notable improvement in courses and examinations for students which they received very positively. Via the online platform, students received instant, differentiated feedback which validated their individual learning outcomes. From the point of view of university teaching, the use of these e-learning examinations had the clear advantage of making assessment and grading processes more efficient, which is why we will continue to use e-learning measures consistently after the project has ended.
- Furthermore, the project team succeeded in improving the courses and the tutoring of students by improving coordination among the institutions involved in training (universities, schools, and teacher training colleges). The improved coordination among training institutions generated synergies that provided clear benefits to students, for instance, the closer link between students and schools enabled students to establish contacts early that would be valuable later in professional life.
- In particular, the fact that university courses were conducted by experts from teacher training colleges led to a measurable increase in professionalism thanks to the implementation of the Innovative Teach-Study-Network. This also became evident in the qualitative and quantitative analyses of the effects of the Innovative Teach-Study-Network. The dedicated ILLEV courses on subject didactics proved to have a significant influence on students' development of pedagogical content knowledge. Those students who already had accomplished the final stage of the Innovative Teach-Study-Network also had the highest test scores in pedagogical content knowledge. We would like to highlight at this point that the positive effects of the Innovative Teach-Study-Network, which became evident in the quantitative analyses, were reconfirmed in the qualitative analyses of the project. The analyses were carried out following the method of structuring qualitative content analysis. In qualitative interviews, both students participating in the Innovative Teach-Study-Network and students from a control group who had no experience with the Innovative Teach-Study-Network were asked to describe a school lesson they had planned and conducted as part of their practical training phase. All in all, the results from the analyses confirmed the positive effects of the Innovative Teach-Study-Network, as the students from the intervention group displayed a more profound reflection on their role as teachers, a more successful application of teaching methods and, thus, higher levels of pedagogical content knowledge.

6 Outlook

The results of the ILLEV project provide both a theoretical and an empirical basis for further national and international follow-up studies. Initial measures already have been taken to successfully implement and further develop the knowledge gained, through conducting further studies. To this end, the BMBF has provided funding for the project WiwiKom (grant no. 01PK11013) and the research initiative KoKoHs (grant no. 01PQ10003).

- **WiwiKom: Modeling and measuring competencies in business and economics among students and graduates by adapting and further developing existing American and Latin-American measurement instruments (EGEL/TUCE):³**

In Germany, cross-institutional assessment of student learning in higher education is becoming an increasingly important area of research. This is particularly true in the field of business and economics which is the most popular field of study among beginning and advanced students (Federal Statistical Office, 2012). Nevertheless, there still was no German-language instrument that met academic requirements for assessing understanding and learning in business and economics in the higher education sector at the beginning of the WiwiKom project (Kuhn & Zlatkin-Troitschanskaia, 2011). Previous research approaches have focused mainly on target groups outside higher education (e.g., PISA).

Funded by Germany's Federal Ministry of Education and Research, the WiwiKom project strives to remedy this research deficit (<http://www.wiwi-kompetenz.de/eng/>). One of the goals of the project is to adapt the TUCE (Walstad, Watts & Rebeck, 2007; Walstad & Rebeck, 2008) designed by the U.S. National Council of Economic Education so it can apply to the German language and culture (cf. Zlatkin-Troitschanskaia, Härdle, Hansen-Schirra & Förster, 2011). In addition, the test shall be evaluated critically regarding its suitability for assessing student learning in economics in Germany. The TUCE is an internationally tested and validated instrument that is being adapted for use in German-speaking countries. Meanwhile, the existing fourth edition of the TUCE (Walstad, Watts & Rebeck, 2007) strives to supply an assessment instrument for school and university students of economic sciences. The test consists of two parts, with 30 tasks for each of macroeconomics and microeconomics. The TUCE is a multiple choice test, with one of four possible answers being correct. The test developers differentiate among three levels – recognition and understanding, explicit application, and implicit application.

Another goal of the WiwiKom project is to adapt the Spanish-language test Examen General para el Egreso de la Licenciatura en Administración (EGEL) developed by the Mexican Centro Nacional de Evaluación para la Educación Superior (CENEVAL) (cf. Zlatkin-Troitschanskaia, Härdle, Hansen-Schirra & Förster, 2011). The tasks in this test were developed jointly by professors and employers. The test includes tasks regarding the fields of management and organization, human relations, finances, and marketing. In addition to this original version, the test was amplified by tasks from the field of accounting so that a large part of the German university and applied sciences curricula was covered. Similar to the American TUCE, the Latin-American test is multiple-choice – one of four possible answers is correct. Both of the tests are internationally approved testing instruments designed to be used in higher education and they include both business content (EGEL) and economics content (TUCE).

Adapting a psychological test is complex. It encompasses far more than merely translating the test items (Beck & Krumm, 1991). Thus, the International Test Commission published Test Adaptation

³ For further information <http://www.wiwi-kompetenz.de/eng/index.php>

Guidelines (TAG) which ensures high-quality adaptations of psychological tests (Coyne, 2000; Hambleton, 2001). In cooperation with Prof Dr Silvia Hansen-Schirra, chair of the school of translation science, linguistics, and cultural science at the Johannes Gutenberg University Mainz, a scientific, professional translation and cultural adaptation of the international test instruments was conducted. Apart from adapting the test, the second main field of endeavor involves developing, testing and modifying the competence model. The test is developed iteratively which means it is adapted closely to the competence model and vice versa.

The first survey was conducted in the winter semester of 2012/2013. A total of 4,000 Bachelor/Master students of economics at various universities in Germany, including universities of applied sciences, were surveyed. A booklet design was used. The first assessment served to calibrate the item pool. The main survey will be conducted in the summer semester of 2013. The sample will be expanded with the use of a revised version of the test. A total of approximately 4,000 to 4,500 students in their fourth or later semesters will be surveyed at all institutions.

- **KoKoHs: Modeling and Measuring Competencies in Higher Education**⁴

Assessing competencies among university students and graduates in the context of the highly differentiated higher education system poses a variety of challenges to researchers regarding content and methodology. The area of higher education largely has been neglected in empirical education research. To close this gap in the research, the initiative Modeling and Measuring Competencies in Higher Education (KoKoHs) was launched in cooperation with Germany's Federal Ministry of Education and Research (BMBF) (Blömeke, Zlatkin-Troitschanskaia, Kuhn & Fege, 2013).

Although the projects funded represent various subject areas, they share the following superordinate questions:

- How can domain-specific and/or generic competencies in selected subjects be modeled (while taking into account specific contextual features)?
- How can these theoretical models be transformed into suitable models and measurement instruments? How can they be tested and validated?

To tackle these challenges jointly in a three-year project, representatives from various fields and universities have formed research associations. An understanding of competencies as the latent cognitive and affective motivational underpinning of performance as defined by Weinert (2001) represents the theoretical framework.

⁴ For further information http://www.kompetenzen-im-hochschulsektor.de/index_ENG.php

In five clusters, about 70 projects are working across disciplines to answer fundamental questions of competence research in higher education and are integrating various research methods. Selected research domains are covered:

- 1) engineering sciences,
- 2) social and economic sciences,
- 3) educational sciences,
- 4) teacher training in mathematics, computer science, science and engineering, and
- 5) generic competencies.

The focus lies on modeling domain-specific and generic competencies acquired academically, while taking into account the particular context. Moreover, these theoretical models are transferred into measurement models and instruments, which then are tested and validated (cf. Blömeke & Zlatkin-Troitschanskaia, 2013).

For four years (2011 to 2015), the coordination office will be responsible for the national and international cross-university coordination of research projects in the field. The coordination office is led by Prof Dr Sigrid Blömeke (Humboldt-University Berlin) and Prof Dr Olga Zlatkin-Troitschanskaia (Johannes Gutenberg-University Mainz).

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APPENDIX

Index of Abbreviations

BA	Bachelor
BAKT	Business Administration Knowledge Test
BMBF	Germany's Federal Ministry of Education and Research
CENEVAL	Centro Nacional de Evaluación para la Educación Superior
EGEL	Examen General para el Egreso de la Licenciatura en Administración
IST	Intelligence-Structure Test
KoKoHs	Modeling and Measuring Competencies in Higher Education
MA	Master
PISA	Program for International Student Assessment
TEL	Test of Economic Literacy
TUCE	Test of Understanding in College Economics
WBT	Wirtschaftskundlicher-Bildungs-Test
WiwiKom	Modeling and measuring competencies in business and economics students and graduates by adapting and further developing existing American and Latin-American measuring instruments

Published to Date

Issue No. 1

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