



# Concepts and Case Studies: The State of Higher Education Research on Inquiry-Based Learning

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First of all, the bad news: Higher education research has not yet precisely determined how widespread inquiry-based learning is at German institutions of higher learning. Empirical surveys of this issue are lacking. Nevertheless, there is extensive literature on the subject. The literature comprises two types of texts: conceptual clarifications and models of inquiry-based learning on the one hand, and exemplary case studies on the other.

## 2.1 The Historical

The notion of inquiry-based learning within a course of studies is not entirely new. Three authors of texts that date back to the beginning of the nineteenth century or, respectively, to 1970 are often cited. The ideal of education through scholarship (*Bildung durch Wissenschaft*) originates with Wilhelm von Humboldt (cf. Humboldt 1810/1993). Contrary to popular assumptions, however, this ideal did not take effect during the nineteenth century, since it was not yet known at the time: Humboldt's position paper "Über die innere und äußere Organisation der höheren wissenschaftlichen Anstalten in Berlin" ("On the internal and external organization of higher scholarly institutions in Berlin") was only discovered in 1896 and published in extracts (Paetschek 2001). In the twentieth century, however, the Humboldtian university ideal came to fruition, as it promoted permanent reference levels for higher education.

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Traces of this can also be found in the influential memorandum from the Federal University Assistants' Conference (BAK) entitled "Forschendes Lernen – Wissenschaftliches Prüfen" ("Inquiry-based learning – scholarly examination"), which was published in 1970 (BAK 1970, p. 7). That memorandum defined the features of inquiry-based learning:

- independent selection of the topic;
- the independent strategy for processing the topic and finding a solution, with the corresponding risks and errors, detours and chance discoveries;
- checking the results in terms of the hypotheses and methods;
- and the public communication and representation of the result (ibid., p. 14 et seq.).

Ludwig Huber's essay on inquiry-based learning as a didactic principle in higher education has also been quoted time and again ("Forschendes Lernen als hochschuldidaktisches Prinzip", Huber 1970). Huber, who at the time was also the chairman of the BAK committee on higher education didactics, intensified the BAK memorandum therein and simultaneously added a liberal arts foundation.

However, despite the fact that inquiry-based learning had long since found a place on the agenda, it cannot be said that it has gained acceptance. The orientation of higher education toward the guiding principle of inquiry-based learning is also by no means self-evident. An international comparison is sufficient to show that the basic conditions for such a concept differ significantly, which also means that some national higher education systems do not necessarily provide for inquiry-based learning at certain levels of academic education.

In France and in French-inspired higher education systems, institutions of higher learning essentially serve the function of academically based vocational training. In Britain and in British-inspired higher education systems, the role of personal development is strongly emphasized. The Humboldtian type of university (ideally) primarily serves the function of conveying scholarship. Structurally, the American model manages to combine all three of these functions. It includes a bachelor's education serving the essential function of personal development, professional education focused on obtaining "professional master's degrees" and, in a narrower sense, a scholarly doctoral education (PhD).

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## 2.2 The Conceptual

Conceptually, inquiry-based learning is classified within a broad field of concepts: experiential learning, exemplary learning, project-oriented learning, research-led teaching, problem-based or, respectively, problem-oriented learning and unity of research and teaching. The fact that early education also uses the term "inquiry-based learning," for example, demonstrates the wide range of ways in which the term is understood. On the one hand, early education claims that the term encompasses "discovery learning," in the sense of learning experiences that individually lead to surprises and that allow the individual to identify what was previously unknown, thereby making it known. In early education,

inquiry-based learning begins “with questions that come from the everyday lives of children and adolescents: What color is water? What does home mean to me? How do you make the perfect free kick?” (DKJS 2015, translated).

On the other hand, inquiry-based learning must be understood as a didactic translation of the (notion of) unity of research and teaching in curricular arrangements in institutions of higher learning. In this case, this deals with student participation in the research process. But even that does not mean that students should move freely along the cutting edge of research – in other words, the results of inquiry-based learning do not need to be novel in the sense of “never before considered or discovered.” It is sufficient that this learning method be “aimed at gaining insights that are of interest to third parties” (Huber 2015, translated). In contrast to discovery learning by children, the primary concern in institutions of higher learning is an approach that is guided by scholarly methods.

Ludwig Huber, who continues to be very committed to the issue, sought to make a conceptual distinction, and has suggested the following type differentiation (Huber 2014):

*Research-based learning and teaching:* This establishes or is based on research and should convey basic problems of research. In particular, it should generate an understanding of the distinction between everyday and scholarly knowledge, and between social and scholarly problems.

*Research-oriented teaching and learning:* This is focused on research. Students go through a process of knowledge acquisition, at the end of which they have arrived at the state of current research where they themselves could begin researching. In so doing, scholarly working methods themselves become the focus of learning, the aim of which is methodological competence. One example is the preparation of a research proposal including a task list, schedule and cost projection.

*Inquiry-based learning* (and teaching, which is made possible thereby): Inquiry-based learning differs from other teaching-learning methods in that it is not so much an issue of imparting secured knowledge (research), but rather of the process of researching and the acquisition thereof, thus the active participation of the students in the process of obtaining knowledge. The learners conduct research themselves so that learning and research coincide (ibid., pp. 33–36).

There is a wide variety of conceivable and existing learning situations in each of the three types. There are differences in the weighting, but sharper distinctions do not appear to be meaningful since the commonalities outweigh the differences: a strong orientation towards students and the use of innovative teaching-learning methods such as cooperative learning or e-learning. Given this, Huber advocates using a common umbrella term: “research-related teaching and learning” (ibid., p. 38).

What is meant by inquiry-based learning in the narrower sense is that students experience the entire research process, learning and reflecting on it independently:

Inquiry-based learning is understood to be a learning style that is characterized by inquisitive, problem-oriented and critical thinking, by autonomous and creative work, as well as by intellectually understanding a research process and direct participation in research projects. (Multrus 2012, p. 53, translated)

The conceptual basis is constructivist learning. It is assumed that each individual constructs a subjective image of their environment, that students independently construct new knowledge as part of an active process, and as such, that educators act not as instructors, but as moderators and coaches. The activity is on the part of the learners, who shape their own learning in a situated process. Educators support, advise and encourage this process, and create a situated learning environment for the learners. In conjunction with this situation, learners develop their knowledge themselves and (constructively) fit that knowledge into their individual knowledge structure. Only then, according to the corresponding concepts, does correctly apprehended knowledge emerge, and in a manner that is less sluggish than knowledge acquired through instruction (cf. Schelten 2000, p. 2).

Traditionally, the priority was (and is) the instruction itself: “The creative power of the human being should first be created through instruction. The constructivist concept of learning, on the other hand, assumes that people already possess creative power, and that this simply needs to be exposed and cultivated” (ibid., p. 5, translated).

In higher education didactics, this has been translated into the phrase “from teaching to learning.” A precarious constraint in underfunded institutions of higher learning is that constructivist learning always requires more effort than teaching that is organized around instruction. Moreover, constructivist learning is difficult to adapt for mass lectures.

Two rationales are invoked for inquiry-based learning within higher education theory or, respectively, higher education policy: on the one hand, an idealistic rationale emulating Humboldt and, on the other hand, a functionalist one. The latter focuses on the function of the university education as what is primarily a non-scholarly employment system. It is certainly possible to build a bridge between these two rationales, however:

If we take a closer look at the kind of core competencies that apparently decide employability (a critical and analytical intellectual capacity; reasoning abilities; capacity to work and learn independently; ability to solve problems and make decisions; planning, coordination and management ability; cooperative work behavior, etc.), it becomes clear that the traditional Humboldtian virtues of cross-fertilization between research and teaching are also astonishingly topical from today’s perspective. It is surprising that the list of skills relevant to employability covers many of the competencies demanded by modern research (Bourgeois 2002, p. 41, translated)

The surprise essentially rests on the fact that there are increasing similarities between the research process on the one hand, and problem-solving professional action on the other. Anyone who studies today will very likely have to make decisions about complicated issues under pressure (e.g. time pressure) and handle complex, risky situations that are characterized by uncertainty in their professional life. In order to do so, he or she must be able to distinguish the essential from the nonessential, to select cause and effect bundles,

to undertake societal contextualization and action impact assessments, to organize problem-solving arrangements, to select options for action and to control processes.

The career path is therefore completed via a university education (instead of other qualification paths) because university graduates often have to deal with situations that are not routine within their professional contexts of action. In order to be able to act confidently in the resulting professional situations, what is needed is a scholarship-based power of judgment, which is to say the ability to methodically manage and critically analyze and evaluate complex issues, as well as an ability to act that is explicitly based thereon. These abilities should also make it possible to solve problems that either cannot be taught during a course of study due to the quantity of material, or that could not have been known: “The learning objective is to develop intelligent knowledge that makes it possible to transfer solution strategies to new situations” (Schumacher 2009, p. 883, translated).

Because students are preparing to manage non-standard situations of knowledge application, successful career paths that originate in higher education must be both developmental and educational: Education teaches us how to survive, and development tells us why, as Hartmut von Hentig noted in a lecture. To this end, “infection through contact with scholarship” would be considered developmental (Daxner 2001, p. 74, translated). Inquiry-based learning is one of the most successful ways to achieve this: It promotes the recognition of correlations and thus the development of a knowledge of correlations; this fosters the ability to recognize the general in the specific.

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## 2.3 The Empirical

As a rule, the empirical apprehension of a situation reveals discrepancies between an idea and the realization thereof. This is also true of inquiry-based learning; the idea and concept of institutions of higher learning, on which these are consistently based, do not typically coincide with the reality of higher education. As mentioned at the outset, there has been no survey on how widespread inquiry-based learning is. Nevertheless, it is still possible to establish how aware students are of the prevalence of research-based courses. Based on the data from the 11th and 12th student surveys and the Studierendensqualitätsmonitor (Student Quality Monitor), Multrus (2012) and Ramm et al. (2014) in particular arrive at a conclusion: not very aware. The results of the 12th student survey were as follows:

- 40 percent of students surveyed at universities and 39 percent of students at universities of applied sciences were unable to provide any information about the existence of research-related study programs.
- Up to a third of students indicated that there are no research-related courses in their degree program, with some differences between students at universities and universities of applied sciences. Twelve percent of students at universities and eight percent of students at universities of applied sciences indicate that they have a wide range of research-related study opportunities (ibid., p. 261 et seq.).

The broad literature on inquiry-based learning contains more descriptions and assessments of case studies than overall surveys (cf., instead of many: Reiber 2007; Huber et al. 2009; FH Potsdam n.d.). These regularly refer to the different and highly diverse forms of such learning: Teaching research project, research workshop, research seminar, project module, case study, practice project, intervention project, action research, or practice research. Recently, “service learning” – the integration of social engagement into the curriculum – has been added to this list. At the same time, this provides a new opportunity to work towards abolishing the (artificial) contradiction between research and practical relevance in a course of studies.

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## 2.4 Conclusion

Unlike schools, institutions of higher learning depend on internal tensions that are what makes them institutions of higher learning in the first place. These tensions range between theory and practice, research and teaching, academic freedom and social responsibility, subjectivity and objectivity, natural sciences and liberal arts, basic and applied research, a specialist and generalist orientation, development and education, tradition and innovation, disciplinarity and interdisciplinarity, certainty and uncertainty.

The specific quality of a given institution of higher learning is not the product of the individual, opposite poles in this charged relationship, but instead in the way those poles are bridged. This gives rise to paradoxes. Immanuel Kant, for example, points out the so-called pedagogical paradox: Pupils are to be empowered to make use of their freedom, and yet must submit to the compulsion of education (Kant 1803/1964, p. 711). We should also mention the paradox in which the unity of research and teaching strives to unite the science that itself is fixated on the lack of knowledge (research) with the science that wishes to bypass ignorance as much as possible (education) (Baecker 1999, p. 64 et seq.).

The strength of institutions of higher learning is not in avoiding such paradoxes, but rather in consciously developing them in order to adequately prepare students to manage the conflict of norms that they will constantly encounter after their studies:

Clergy deal with sinners and heretics, judges with lawbreakers and parties to a dispute, teachers with the deviant behavior of adolescence, psychologists with patients attached to their neurotic infantilisms, administrators with citizens and politicians who refuse to comply with the bureaucratic exigencies, architects with builders and their idiosyncrasies, engineers with business economists who counter their creative designs with cost arguments, etc. (Lenhardt 2005, p. 101, translated)

For this reason, as a rule, attempts at higher education reform likewise fail when, instead of cultivating the tensions, they seek to make one pole dominant, for example teaching rather than research, or practical application rather than a theoretical approach. Inquiry-based learning, on the other hand, is a paradigmatic example of how bridging one of the constitutive tensions on which institutions of higher learning depend can succeed.

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