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In the course of educational expansion, not only has the total number of students increased, but also their composition has changed: In quantitative terms, more and more people are gaining access to higher education – currently 46% of people born in a given year, as compared to just 5% in the mid-1950s. In terms of socio-structural dimensions, it is possible to say that today, more than ever, people from non-academic families are studying, as are people who already have professional experience and/or have no conventional university entrance qualification. In addition, students are more likely to be gainfully employed or have children or other care responsibilities. A health impairment is likewise no longer a barrier to study in and of itself. In short: Within a relatively short period of time, there has been a profound change in the higher education landscape, with the keyword “heterogeneity” pointing to the fact that the life contexts and educational biographies of students are currently more diverse than was previously the case.

The German Science Council (Wissenschaftsrat) has made reference to the changes and, in its 2008 recommendations on improving the quality of teaching and studying, pointed out that “the diverse requirements of a heterogeneously assembled student body [should] be better taken into account” (Wissenschaftsrat 2008, p. 53, translated). And in 2015, that same Council stressed: The “high numbers and the resulting increased heterogeneity among the students are fundamentally confronting the higher education system with new challenges regarding the organization, design and orientation of the courses offered” (Wissenschaftsrat 2015, p. 14, translated). The German Rectors’ Conference (Hochschulrektorenkonferenz) has also addressed the issues of diversity and permeability within the context of the project “nexus – Concepts and Good Practice for Academic

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383

Education,” and has confirmed its relevance in the field of science (HRK 2013). Against this background, the question explored below will be: to what extent is inquiry-based learning suitable for heterogeneity-sensitive and inequality-relevant teaching-learning concept that fulfills the current requirements for the design of teaching?

36.1 Study-Relevant Dimensions of Heterogeneity

Although the question of heterogeneity in school and educational policy debates has been on the agenda since the late 1960s, especially in connection with opportunities (inequality), it has only attracted attention in higher education policy since the turn of the millennium (cf. Webler 2013). The current university-based debate on heterogeneity focuses in particular on changes in the student body and largely ignores the question of the diversity of young academics or the diversity of instructors, despite the fact that these aspects are at least as important in terms of scholarship and higher education policy. It is also striking that the topic of heterogeneity in higher education is treated “primarily in a *performance-related* and *problematizing* manner” (Wild and Esdar 2014, p. 22, translated; emphasis in original) and tends to be cast as negative. On top of that, the recognition of heterogeneity in university discourse often refers to social or ancestral attributions, and accentuates differences between students, for example those with a migrant background or without, from academic families or educational distance, etc.

As a rule, those who do not belong to the student majority due to their social background, or who do not correspond to the expectations of normalcy in academic life in terms of socio-cultural resources are usually marked as heterogeneous. In doing so, it is possible to find more heterogeneous dimensions that are relevant to the course of study and, in principle, address all students. A distinction can be made between at least three dimensions that outline study-relevant heterogeneity (Fig. 36.1):

- On the one hand, it is students’ life situations and contexts as *structural* factors that influence student life and highlight opportunities in a course of study. These include (educational) biographical and basic socio-economic conditions that shape the course of studies and influence how the study requirements can be met, for example.
- On the other hand, study-relevant heterogeneity represents diversity of learning types with regard to *action or competence-related* aspects. These include learning experiences, as well as the way of acquiring knowledge, self-organization and problem-solving as cognitive skills.
- Moreover, there are *personality-related* dimensions of study-relevant heterogeneity, which are expressed in the choice of topic and the nature of the problem description, for example. Methodical preferences and the chosen subject combination are also included herewith.

Here, the paradigmatic dimensions of heterogeneity are of course not distinct. Sometimes they mesh, but they do not require one another. Taken in isolation, they are not

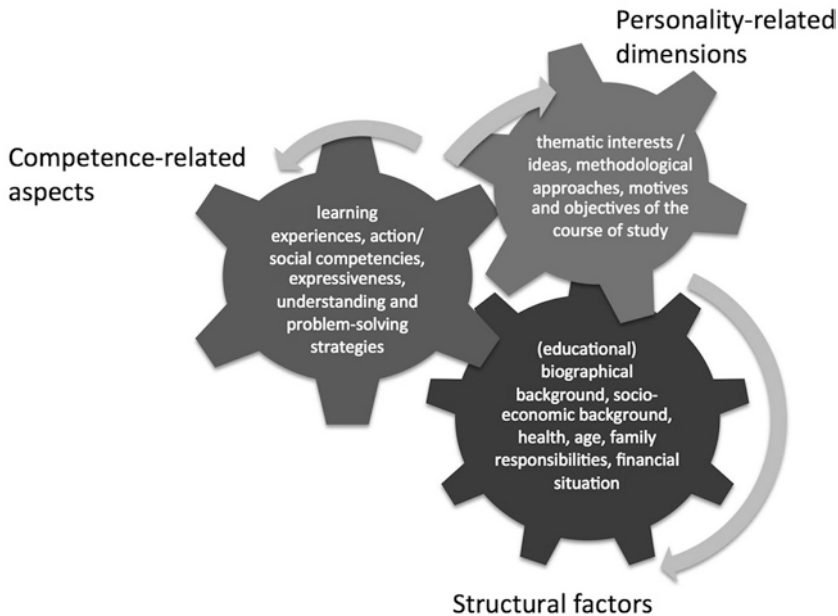


Fig. 36.1 Study-relevant dimensions of heterogeneity. (Source: author's representation)

very meaningful in terms of their impact on whether a course of study is successful. It is only in the overview of different study-relevant dimensions of heterogeneity and in the reconciliation with the requirements of the university and the relevant discipline that points of reference can be identified that favor or impede progress in the course of studies. Finally, the outlined categories of difference point to an immense variance in student profiles that teachers encounter in practice, and which they should recognize when designing teaching programs.

36.2 Convergence Between Inquiry-Based Learning and Heterogeneity

The expert report for a heterogeneity-oriented teaching-learning culture, recently drafted on behalf of the German Rector's Conference (Hochschulrektorenkonferenz), points to the enormous effort required from various institutions, and also emphasizes that higher education policy negotiations are necessary "with regard to understanding quality, heterogeneity and (distributive justice)" (Wild and Esdar 2014, p. 79, translated). This report concretely refers to inquiry-based learning and states that "these forms of indirect instruction place high demands on the [...] competence of instructors" (ibid., p. 50). As is further argued with regard to the students, action-oriented teaching-learning settings are "only effective [...] if learners had the necessary (technical, scientific-propaedeutic, cooperative, self-regulatory, etc.) abilities." Instructors who refer to inquiry-based learning are not considered "activators" in the report, but are explicitly considered "facilitators" in the sense of

learning accompaniment (ibid., p. 48), although inquiry-based learning is commonly considered an empowering teaching method. On the other hand, good, heterogeneous teaching requires “strong structure, clear leadership, a cognitive framework and many short-term aids” (ibid., p. 84). In this respect, it could be concluded from the expert opinion that the open format of inquiry-based learning is not suitable for a heterogeneous body of students.

In contrast, we intend to subsequently show why inquiry-based learning is a tried and tested heterogeneity-sensitive teaching-learning concept, which, as an extremely student-oriented format, is able to conceptually and constructively address the diversity of students, and also addresses inequality-relevant dimensions within the university context. Formulated as a thesis: *Inquiry-based learning accounts for (1), includes (2) and fosters (3) heterogeneity* (see Fig. 36.2).

36.2.1 Inquiry-Based Learning Accounts for Heterogeneity

Provided that differences and inequalities within students are perceived and recognized, inquiry-based learning conceptually accommodates diversity in students’ starting situations and interests. This is because inquiry-based learning takes heterogeneity into consideration by offering creative space and addressing various learning and skills development processes that are based on the skills and needs of the students. It is characterized by teaching-learning settings that aim to involve as many students as possible in a process of (relatively self-guided) learning and research. Despite the students’ varying resources, learning styles, motivations and skills, inquiry-based learning offers them options to

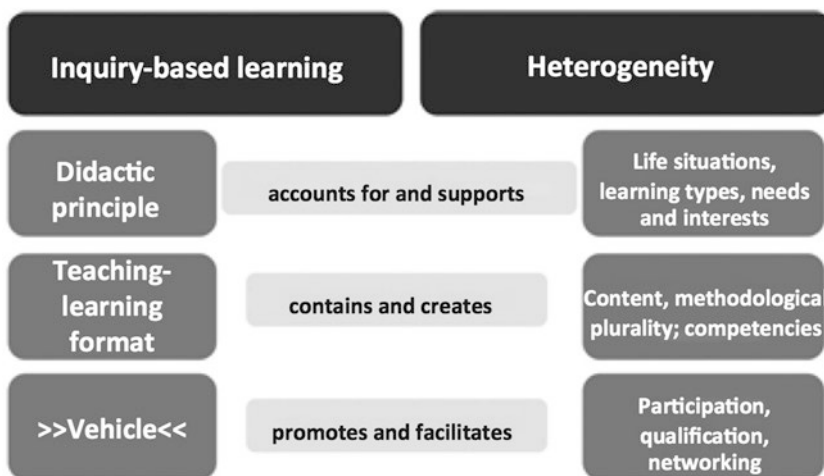


Fig. 36.2 Interplay of inquiry-based learning and heterogeneity. (Source: author’s representation)

engage with their respective potential and resources, and supports them in developing their knowledge and abilities.

Although it is difficult to sufficiently take into account individual situations or problems, especially in large courses, inquiry-based learning as a didactic principle essentially allows and requires a student-oriented attitude. After all, good teaching is also characterized by flexible (not to be equated with individualized!) teaching-learning arrangements. The openness of the concept offers many possibilities for variation in practice, as long as the instructors themselves are open to this and provide a helping orientation framework (cf. Huber 2009). Nevertheless, and this should not be ignored here, the openness of the format simultaneously poses a difficulty, and requires both didactic and social design competencies on the part of the instructors. In order to facilitate multi-layered and lively learning, it is necessary to clarify any issues regarding fit, for example in terms of time resources for the teaching-learning process, but it is also necessary to clarify learning objectives and examination arrangements with the students at an early stage. This is not only important and profitable for the students, but also for the instructors: In this way, they gain insights into the unequal (initial) conditions of the students and structural imbalances that can be fed back into the upcoming learning activities and interwoven as a reflective practice in the teaching-learning process.

36.2.2 Inquiry-Based Learning Includes Heterogeneity

Just as inquiry-based learning considers and supports heterogeneous preconditions, interests or competencies, diversity is conversely relevant for inquiry-based learning: This is because the concept is based on the heterogeneity of science and research, and thus on the diversity of disciplines, methods and theories. “Epistemic diversity in research – the diversity of themes, objects, problems and approaches to problem solving” (Gläser 2014, p. 163, translated) is to some extent constitutive for inquiry-based learning. The diversity of forms and elements characteristic of the idea and practice of inquiry-based learning involves and generates a variety of perspectives and methods. As a teaching-learning approach, it is therefore predestined for interdisciplinary work and is suitable for mixed subject and competence teams, which thus open up synergies and advance the pluralization of knowledge. In addition, the forms of learning, research questions and approaches are characterized by the different ideas and problem descriptions of the students, i.e. their heterogeneity is an integral part of this concept.

In the case of inquiry-based learning, the interaction between instructors and learners differs of other teaching-learning formats primarily in the fact that processes of knowledge generation are designed to be as cooperative as possible. (Special) knowledge is not taught to the students head-on and hierarchically as certainties or completed knowledge; instead, the participants embark together on a process of exploration and knowledge production. And if the subject area permits, diversity or heterogeneity can also be the subject of teaching and research (see Kaufmann, in this volume).

As knowledge and research practice that is newly constituted again and again (both in terms of topics and personnel), inquiry-based learning benefits from the diversity of students and their approaches to content and methodology. And moreover: inquiry-based learning takes into consideration diverse levels of knowledge and coping patterns, thus building on heterogeneity. However, this is associated with the challenge of getting involved in the research teaching-learning process (also as an instructor), of reflecting on practical routines, and of not excluding, *ex ante*, innovative but poorly tested approaches.

36.2.3 Inquiry-Based Learning Fosters Heterogeneity

So far, little attention has been paid to the fact that inquiry-based learning can also promote (institutional) heterogeneity and contribute to the diversification of academic life. This aspect is important because the higher education system at all levels is characterized by a high degree of social selection: Institutional mechanisms of exclusion are not only in play in terms of access to and completing a course of study, but social disadvantages are also brought to bear in the area of young researchers; overall, the chances of participation in the academic system are unevenly distributed (for example, Wolter 2011; Heitzmann and Klein 2012). Inquiry-based learning addresses these difficulties by encouraging and prompting *all* students to take part in research activities.

Detached from implicit notions of normality and competence expectations, exploratory learning grants equal opportunity to all students and assumes responsibility for taking on the knowledge generation process. In so doing, the research activities selected by the students can be carried out autonomously or “docked” onto existing research networks. Through active participation and the implementation of a small subproject within a larger research network, students can be professionally and socially involved and networked with the “scientific community.” They can deal with subject-specific topics and methods, practice project management and thus (continue to) gain qualifications – all in a manner that is separate from the pressure to succeed. In this respect, inquiry-based learning can be regarded as a mode that supports students in their entry into research practice and the research community, thus expanding their opportunities to participate in the field of science. Inquiry-based learning can be used to bridge the gap between students and scientists or research facilities that foster the diversity of subject-related and academic identity processes of students. On the other hand, this contact allows the research facilities to generate up-and-coming scientists, and they gain insights into students’ needs and issues (in detail, Satilmis 2013; Kaufmann and Satilmis 2015). All in all, this opens up opportunities to look at structural inequalities without hypostasizing them.

36.2.4 Interim Summary

Taking stock, it can be said that inquiry-based learning is a (didactic) path that accommodates and benefits from the heterogeneity of the students. At the same time, heterogeneity is conceptually important for inquiry-based learning, because the teaching-learning concept is based on multiperspectivity. Following on from the thesis formulated at the outset, which emphasizes the added value of inquiry-based learning in dealing with heterogeneity, it is now possible to add the following: *Heterogeneity provides a fertile basis for inquiry-based learning.*

Within the context of heterogeneity, one important aspect of inquiry-based learning lies in the fact that “non-traditional” students do not experience any deficient attributions in this teaching-learning approach, and that unconventional perspectives of cooperative scientific practice are also given space in which to develop. Finally, the idea of inquiry-based learning refers to an understanding of education that embraces the notion of social equality and “[includes] the obligation to create the social conditions to ensure the participation of all citizens” (Euler 2005, p. 257, translated). Inquiry-based learning allows students and scientists to approach one another reciprocally on research projects and, in particular, can reduce research-related inhibition on the part of students. In this way, prospects open up for the further development of learners and instructors, but also of the institution. In this respect, the teaching-learning format is understood as a “vehicle” for opening up the university socially.

36.3 Outlook: “e n t e r s c i e n c e” – Pluralization of Science Practice by Means of Inquiry-Based Learning

Overall, inquiry-based learning offers variegated starting points for a pluralization of scientific practice. How diversity in teaching and learning is driven forward and opening up academic life can be supported will subsequently be outlined on the basis of measures implemented at the University of Bremen.

At the University of Bremen, inquiry-based learning is understood to be a central profile trait and follows on from a long tradition of project-based studies (the “Bremen model”) (cf. Kaufmann & Schelhowe, in this volume). In addition to the claim of a close link between teaching and research, it relies on a conscious commitment to heterogeneity. The pilot measure, “e n t e r s c i e n c e,” which has been developing and implementing heterogeneity- and inequality-sensitive teaching-learning courses at the University of Bremen since 2011, must be situated within this context. As an interdisciplinary project, it operates at the interface of teaching, research and the promotion of young researchers in order to increase the participation chances of structurally disadvantaged students in academic life (cf. Satilmis 2013 and 2015).

The intersectional project strategically relies on the inquiry-based learning approach to achieve “scientific bonding” effects and contribute to the reflective extension of the

science system. According to the core idea, the mechanisms of “scientific bonding” are effective when students familiarize themselves with academic life from an internal perspective, participate in research networks and experience “empowerment.” In addition to transdisciplinary knowledge and methodological skills, these are general competencies in the sense of key qualifications, which are developed in “e n t e r s c i e n c e” and combined with a (self-)reflective practice. On the basis of self-guided learning, students are to gradually be able to grow into the research community, see the conditions and try things out. Finally, social and professional involvement in academic life increases the motivation to study and learn, and experiences of self-efficacy grow (Satilmis 2015). Basically, the quality of academic studies and the prospects for the successful completion thereof improve with early academic participation and support (cf., Merkt 2012, Kreft and Leichsenring 2012, p. 146 et seq.). This may be an explanation for the degree to which the “e n t e r s c i e n c e” courses resonate with students, which is attended by a strong interest on the part of instructors and researchers in the ideas and potential that students bring with them.

Although only a teaching-learning format, the concept of inquiry-based learning radiates far beyond the field of study and teaching: whether as a principle of student orientation, as a method of engagement with diversity, as a tool in dealing with heterogeneity or as a way for institutional pluralization, the added value that inquiry-based learning provides for lively and subject-related teaching, as well as for the equitable further development of the university, is enormous. This is because inquiry-based learning activates mechanisms of participation in science and research and can be excellently combined with university policy strategies for heterogeneous recruitment of junior researchers, but above all, inquiry-based learning in combination with heterogeneity addresses key topics of the education and higher education policy agenda in the sense of transforming institutions of higher learning.

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