



Higher education policies and interdisciplinarity in Germany

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Abstract

Universities have increasingly been subjected to policy- and industry demands to produce multi- and interdisciplinary knowledge. This paper explores the extent to which different higher education policy instruments are used to promote interdisciplinarity in teaching and research at universities in the German higher education system comparing them across different federal states. Based on a manifest content analysis of higher education laws and performance agreements with universities in the 16 German states, we were able to distinguish between three types of states: Those a) with a general use of policy instruments aimed at all universities in a state, whereas considerable differences could be observed with regard to the degree of coercion (enabling versus prescriptive provisions) and scope (teaching or research), b) a directed use of policy instrument, targeting specific universities, and c) a hybrid use of policy instruments using both general and directed elements. This paper provides a novel mapping of the promotion of interdisciplinarity in German higher education policies through a variety of policy instruments and hereby contributes to the extant literature on interdisciplinarity in higher education.

Keywords Germany · Higher education · Interdisciplinarity · Policy · Regulation

Introduction

In recent years, societal demands for research to address major societal challenges, such as virus spread, ageing populations, global warming and sustainable development, have grown. Policy-makers in particular emphasise the need for multi- and interdisciplinary knowledge to solve these challenges (European Union Research Advisory Board, 2004; LERU, 2016). Thus, universities as producers of knowledge are increasingly targeted by policy makers and industry to address the challenges in interdisciplinary ways. Despite these calls, we observe to date limited empirical research on the consideration and promotion of interdisciplinarity in higher education (HE) and research policy (Donina et al.,

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2017; Jacobs & Frickel, 2009). Only few studies have focused on interdisciplinary research policies on a system level (see, for example, Donina et al., 2017 for an analysis of the Italian system and Woelert & Millar, 2013, for Australia) and we know little about what policy instruments governments use to foster interdisciplinarity in teaching and research in universities.

This paper aims at furthering the understanding of how and to what extent regulatory policy instruments promote interdisciplinarity in universities, drawing on empirical evidence from the German HE system. The German HE system is interesting in various regards. It is a federal system, in which education is regulated by the 16 states. Although the influence of New Public Management principles on the governance of HE varies, high levels of academic freedom are observable across all states. Nevertheless, Germany can be characterized as a “*Rechtsstaat* regime” (Nyhagen et al., 2017), which means that government legislation plays a significant role for the governance of HE, including the promotion of interdisciplinary initiatives at universities. Specifically, we ask: *To what extent do HE policies in the German states promote interdisciplinarity in universities and how do they compare?*

Interdisciplinarity in higher education and research

Interdisciplinarity refers to the combination and integration of knowledge – or, more concretely, “information, data, techniques, tools, perspectives, concepts, and/or theories” (National Academy of Sciences, 2005, p. 188) – from two or more disciplines (Brewer, 1999; Klein, 2010; OECD, 1972). Beyond this rather broad definition, there have been numerous attempts to develop conceptualisations and typologies of interdisciplinarity. Interdisciplinarity is a highly complex concept and is oftentimes used to refer to different forms of ties between scientific disciplines, including multidisciplinary, pluridisciplinarity, cross-disciplinarity, interdisciplinarity and transdisciplinarity, whereas multidisciplinary is constituted by weaker and transdisciplinarity by strong ties between scientific disciplines (Klein, 2010). This study uses interdisciplinarity as a generic term, encompassing the different types of ties between scientific disciplines presented above.

Interdisciplinarity and especially interdisciplinary research are deemed increasingly important in addressing the ‘grand societal challenges’¹ of our time, such as, for example the Sustainable Development Goals. Phenomena related to societal challenges are of increasingly complex nature and as argued by policy makers, can no longer be approached by relying on the knowledge of single disciplines (Huutoniemi, 2016). Multiple studies and policies acknowledge the potential of interdisciplinary research in terms of its capacity to create inter alia innovation, to increase the adaptive capacity of universities, and to break down barriers to enable breakthroughs (see e.g.: Crow, 2010; O’Brien et al., 2013). Calls for interdisciplinarity do, however, not only extend to research, but also include university teaching. As Weingart (2014) and Henkel (2007) argue, university teaching needs to respond to external demands, including those of labour markets and global challenges, which go beyond the solutions and skills that can be taught in a disciplinary way.

¹ Although widely used in particular by policy makers but also in scientific literature, the concept of grand challenges needs to be regarded critically as to the potential threat it poses for the autonomy of science (see Kaldewey, 2018, for elaboration).

Therefore, “discipline-based scholarship is no longer regarded as sufficient qualification for university teaching” (Henkel, 2007, p. 200).

Yet, several studies show that in practice, interdisciplinarity does not always live up to these promises and expectations (e.g. Albert et al., 2017; Woiwode & Froese, 2020; Ylijoki, 2022). There is a growing body of literature not only describing practices of interdisciplinarity, but also outlining the challenges and obstacles to interdisciplinarity in HE (Vienni et al., 2019). Literature shows that interdisciplinary collaborations face structural, psychological and ideological barriers (Engwall, 2018), which have their origin in the strong disciplinary organisation of science in universities (Cummings & Kiesler, 2005); some disciplines remain resilient to interdisciplinary collaboration (Leišytė & Hosch-Dayican, 2016). Carrying out interdisciplinary research is highly complex as disciplinary languages and epistemic cultures of different disciplines need to be bridged (Becher & Trowler, 2001) and a threshold needs to be overcome to be able to understand and respect different epistemologies and ontologies (Bracken & Oughton, 2006; Land, 2012; MacLeod, 2018). These processes may create uncertainties and anxieties, as the new knowledge created based on interdisciplinary research needs to be acknowledged and evaluated by peers (who most likely are disciplinary oriented), through publishing (Lyll et al., 2011), evaluation (Huutoniemi & Rafols, 2017), as well as funding (König & Gorman, 2017; Louvel, 2016; Sá, 2008).

To date, only few studies have explored how policies and policy instruments promote interdisciplinarity in universities. Previous research in this direction has analysed government reports, policies and strategy papers to understand the governance of interdisciplinary research at the national level in Australia and Italy (Donina et al., 2017; Woelert & Millar, 2013). The study by Woelert and Millar (2013) found a mismatch between strongly programmatic discourses on interdisciplinarity in Australian governmental higher education policy documents and actual practices and mechanisms of research funding and evaluation. Donina et al. (2017) explored the policy portfolio used to promote interdisciplinarity at the system level in Italy and, in a similar vein as Woelert and Millar (2013) found that the policy instruments applied to foster interdisciplinarity oftentimes clash with existing, heavily discipline-based organisational structures, demands and expectations posed in the context of funding and evaluation, and recruitment and career procedures. Regarding the German context, Weingart’s work (2000, 2012) suggests that while interdisciplinarity has emerged as an organisational principle in higher education institutions (HEI), it is still widely practiced in highly specialised multi- or transdisciplinary academic units that exist in parallel to traditional disciplinary structures and thus function as an “enhanced developmental periphery” (Weingart, 2012, p. 14).

Conceptualising policy instruments

For the purposes of this paper, we follow one of the most common definitions of policy instruments by Vedung (1998), who states that “[p]ublic policy instruments are the set of techniques by which governmental authorities wield their power in attempting to ensure support and effect or prevent social change” (p. 21).

Policy instruments have been categorised by various authors in different ways. Anderson (1977, as cited in Vedung, 1998) has pointed out four ways in which governments can enact public policy: 1) By relying on market mechanisms (often equated with government non-interference), 2) by offering structured options, thus implementing programmes that individuals are free to use or not as they see fit, 3) by providing biased options, which

include “incentives and deterrents guiding individuals [or organizations] voluntarily towards the desired ends”, and 4) Through regulation, which implies direct control either through constraints and imperatives whereas non-compliance is punished through the coercive powers of government.

Mitnick (1980) distinguishes regulation by directives and regulation by incentives. He defines the first as “the interferences that occur by circumscribing or directing choice in some area –i.e. making rules for behaviour that may be transmitted as instruction”. Regulation by incentives, on the other hand, is defined as “the interferences that occur by changing the perception of the nature of the alternatives for action subject to choice – i.e. changing the relative attractiveness of alternatives “ (Mitnick, 1980, pp. 342 f). Similarly, Bardach (1979) has proposed four types of policy instruments: prescription, enabling, positive incentives, and deterrence, while Vedung (1998) identified legal, economics, and communication instruments – or, in his own words, “carrot, sticks and sermons”.

Another widely used typology of policy instruments by Hood (1983) distinguishes between information, treasure, authority, and direct action instruments. Van Vught (1995) pointed out that Hood’s categorisation corresponds to the degree of restriction being imposed by policy instruments: from least restrictive information instrument to authority being most restrictive policy instrument. Authority instruments of direct action allow governments to command and forbid certain behaviour, including the use of government monopoly on violence. Hood’s (1983) presentation further includes the distinction between particular and general application of such instruments (Hood, 1983, p. 17).

Recent literature has indicated a shift “from hierarchy to markets and networks” (Nyhagen et al., 2017, p. 281) in policy making. Drawing on the work of Howlett (2005), Nyhagen et al. (2017) claim that governments are nowadays “facilitating more than directing behaviour of target groups” (p. 281). At the same time, the authors refer to Germany as a “Rechtsstaat regime” in which the (federal) state(s) is/are assumed to be “an important integrating force within society” and public policy and HE reforms still heavily depend on and are shaped by legislation (Nyhagen et al., 2017, p. 278), even though it is the 16 states that have the regulatory power in the education sector.

Based on these considerations, this study focuses on regulation and legislation issued by the governments and ministries of education of the 16 German states. We draw upon the work of Mitnick (1980) and Bardach (1979), who distinguish regulation by directives and regulation by incentives, or, respectively, prescription versus enabling, to understand to what extent and through which policy instruments the governments of the sixteen German states try to foster interdisciplinarity in HE and research. The study was further informed by Hood’s (1983) distinction of particular and general use of instruments. In order to investigate which universities are targeted by government efforts to promote interdisciplinarity, we asked whether the policy instruments at play are “directed at specific and named individuals, organizations or items”, or “beamed at the world in large” (Hood, 1983, p. 17).

Methodology

The German HE system is a federal, largely public system with a state-dominated funding model (Hüther & Krücken, 2018). It features strong degrees of professorial power and academic freedom, which limit the potential of top-down policy interventions. Responsibilities for the legal regulation as well as the funding of public HEIs lies with the 16 states, each of which has their own HE laws and regulatory system (Hartwig, 2006; Kehm & Lanzendorf, 2006). The involvement of the federal government in HE policy-making

Table 1 Overview of state HE laws and versions used for analysis

State ^a	Name of HE law or legal framework	Version
BW	Gesetz über die Hochschulen in Baden-Württemberg (Landeshochschulgesetz—LHG)	01.01.2005
BY	Bayerisches Hochschulgesetz (BayHSchG)	23.05.2006
BE	Gesetz über die Hochschulen im Land Berlin (BerlHG)	26.07.2011
BB	Brandenburgisches Hochschulgesetz (BbgHG)	28.04.2014
HB	Bremisches Hochschulgesetz (BremHG)	09.05.2007
HH	Hamburgisches Hochschulgesetz (HmbHG)	18.07.2001
HE	Hessisches Hochschulgesetz (HHG)	14.12.2009
MV	Gesetz über die Hochschulen des Landes Mecklenburg-Vorpommern (LHG M-V)	25.01.2011
NI	Niedersächsisches Hochschulgesetz (NHG)	26.02.2007
NRW	Gesetz über die Hochschulen des Landes North Rhine-Westphalia (HG)	16.09.2014
RP	Hochschulgesetz Rheinland-Palatinate(HochSchG)	16.09.2014
SL	Saarländisches Hochschulgesetz (SHSG)	05.12.2016
SH	Gesetz über die Hochschulen und das Universitätsklinikum Schleswig–Holstein (HSG)	05.02.2016
SN	Sächsisches Hochschulfreiheitsgesetz (SächsHSFG)	15.01.2013
ST	Hochschulgesetz des Landes Saxony-Anhalt (HSG LSA)	14.12.2010
TH	Thüringer Hochschulgesetz (2018)	01.09.2016

^aBaden-Württemberg (BW), Bavaria (BY), Berlin (BE), Brandenburg (BB), Bremen (HB), Hamburg (HH), Hesse (HE), Lower Saxony (NI), Mecklenburg-Vorpommern (MV), North Rhine-Westphalia (NRW), Rhineland-Palatinate (RP), Saarland (SL), Saxony (SN), Saxony-Anhalt (ST), Schleswig–Holstein (SH) and Thuringia (TH); abbreviations according to the ISO 3166–2 code for provinces and states

is limited constitutionally and includes contributions to research funding and regulations related to access to HE. Public funding accounts for up to 90% of a HEI's budget, around 75% of which are allocated by the state governments (Hochschulrektorenkonferenz, 2020).

Since the late 1990s, we observe a shift towards university organisational autonomy with varying degrees of manifestation across the German states. This shift has come along with increasing degrees of performance-based elements in public funding (de Boer et al., 2015), ranging from as little as 1.4% (Saxony) to 66% (Berlin) (Wespele & Jaeger, 2015). In most states, the accountability of HEIs is reinforced through the use of performance agreements, which typically target teaching, research, and equal opportunities and are drawn between the states and their individual universities (Hüther & Krücken, 2018). Traditional legal frameworks, i.e. HE laws, are increasingly complemented by these agreements.

Based on these considerations and following Nyhagen et al.'s (2017) categorization of Germany as a “Rechtsstaat regime”, in which governmental legislation plays a key role for HE policy, this study focuses on both the HE laws of the 16 German states and on performance agreements or contracts drawn between state HE ministries and their universities. The latest versions of state HE laws (see Table 1) were identified through the legal standard database of the Standing Conference of the Ministers of Education and Cultural Affairs (*Kultusministerkonferenz*, KMK).

To identify target- and performance agreements or contracts, either with individual or all HEIs in a state, we used the websites of state ministries responsible for HE and the website of the German Rectors' Conference (Hochschulrektorenkonferenz, 2020). Individual agreements with all public universities were available and were analysed for all but three states. For these three states, contracts, financing or development plans with all of their

Table 2 Level (individual or all HEIs in a state) and number of examined agreements and contracts and their periods of validity

State	Level	No.	'13	'14	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25
BW	State level	1													
BY	Indv. Univ.	9													
BE	Indv. Univ.	3													
BB	Indv. Univ.	3													
HB	Indv. Univ.	1													
HH	Indv. Univ.	3													
HE	Indv. Univ.	5													
MV	Indv. Univ.	2													
NI	Indv. Univ.	9													
NRW	Indv. Univ.	14													
RP	Indv. Univ.	4													
SL	Indv. Univ.	1													
SH	State level	1													
SN	State level	1													
ST	Indv. Univ.	2													
TH	Indv. Univ.	4													

HEIs were analysed. This concerns Baden-Württemberg (HE financing plan “Hochschulfinanzierungsvertrag”), Saxony (HE development plan „Hochschulentwicklungsplan“) and Schleswig–Holstein (HE contract „Hochschulvertrag“). In total, 60 individual university- and three state-wide agreements and contracts were included in the analysis. An overview of the number and type of the examined documents as well as their periods of validity are presented in Table 2 below.

To understand whether and how interdisciplinarity is promoted in the HE regulations at state level in Germany, a content analysis was employed. Due to the great number and volume of documents, we based our analysis on manifest content. This method allows for an unobstrusive (Babbie, 2010) and highly reliable analysis of the use of concrete terms in the selected documents. Keywords to capture the different types of the generic term interdisciplinarity were identified based on literature review and included inter-/multi-/and transdisciplinary (*inter-/multi-/transdisziplinär*), Inter-/multi-/transdisciplinarity (*Inter-/Multi-/Transdisziplinarität*), cross-disciplinary (*disziplinübergreifend*), across subjects/fields (*fächerübergreifend/fachübergreifend*), and across faculties (*fakultätsübergreifend*). Both references to interdisciplinarity in research and teaching were considered. In a first step, we conducted searches (automated for text files, manual for scanned documents) for occurrence of these keywords using the software NViVo. For validity reasons and in order to be able to identify the areas of interdisciplinarity that codes refer to (research or teaching) as well as the nature of policy instruments (enabling versus prescriptive), we then conducted a latent content analysis of (parts of) the sentences around the identified keywords.

Findings

Our analysis revealed a broad spectrum of ways in which interdisciplinarity is promoted in the German HE system, ranging from states with a general and merely enabling approach to states using concrete prescription in order to promote interdisciplinarity in universities, from states formulating provisions for interdisciplinarity for all of their universities to states negotiating interdisciplinarity in different ways with individual universities (see Table 3). We furthermore observed state HE laws providing a broader legal basis for

Table 3 Findings regarding the use (general, directed, hybrid) of policy instruments promoting interdisciplinarity in the German states

Use of Policy Instruments	Description	States
General	Policy instruments applicable to all universities within the system (typically through state HE laws)	BW, BE, HB, HH, MV, RP, SH
Directed	Policy instruments directed at specific universities (typically through university agreements)	BY, BB, HE, NI, NRW, ST
Hybrid	Mix of general (applicable to all universities) and directed (at specific universities) use of policy instruments	SL, SN, TH

interdisciplinarity, especially with regard to teaching, while a majority of references to interdisciplinarity in university agreements was concerned with interdisciplinary research.

General use of policy instruments

States with a general use of policy instruments typically promote interdisciplinarity through their state HE laws, which are directed at all HEI within a respective state. These states do either not possess agreements with individual universities or do not address interdisciplinarity in university agreements. We found that states with a general use of policy instruments promote interdisciplinarity to a varying degree and that their policy instruments vary substantially in their nature, ranging from states with merely enabling instruments to states with a strongly prescriptive approach, either or both in the area of teaching and research (see Table 4).

Prescribing interdisciplinarity

The state HE law in Mecklenburg-Vorpommern contains two prescriptive references to interdisciplinarity, one in the area of research, the other in the area of teaching. With regard to teaching, the law demands that “universities strive to establish nationwide and interdisciplinary research priorities”. Regarding teaching, the law states that universities have to offer courses that convey interdisciplinary competences in the manner of what is often-times referred to as “studium generale”, or “studium fundamentale” in the German context and in which students participate in interdisciplinary courses or take courses from other disciplines.

In Berlin, the state HE law strongly emphasises interdisciplinarity in a mostly prescriptive manner. The law demands interdisciplinarity in the areas of teaching, doctoral education, and research. Universities have to offer teaching that is interdisciplinary, project-based, and links scholarship with practice. Doctoral colleges are to be established “(i)n order to promote the investigation of interdisciplinary scientific questions”. Moreover, the law states that universities “shall strive to form research priority areas and include them in the development plans”, whereas “(p)articular attention shall be paid to the development of interdisciplinary research priorities”. In addition, the state law contains provisions

Table 4 Use of policy instruments (general-prescriptive or general-enabling) for promoting interdisciplinarity in teaching and research

State	Policy approach & area			
	<i>Prescriptive</i>		<i>Enabling</i>	
	Teaching	Research	Teaching	Research
BW				
BE				
HB				
HH				
MV				
RP				
SH				

enabling interdisciplinarity in teaching and providing a legal basis for the creation, funding and decision-making of interdisciplinary research groups.

Enabling and prescribing interdisciplinarity

A mix of enabling and broadly prescriptive policy instruments to promote interdisciplinarity was found in Bremen, Hamburg, Rhineland-Palatinate and Schleswig–Holstein, all of which are small states with a very small number of HEI. The state HE law in Bremen takes a mostly prescriptive and partly enabling approach to promote interdisciplinarity. It addresses both teaching and research by stating that interdisciplinary research profile areas shall be created on a temporal basis and that teaching needs to enable students to “work in a problem-oriented, interdisciplinary manner enabling them to address socio-scientific questions”. An enabling element is found in a definition of master’s degree programmes, which allows for interdisciplinary teaching.

The state law in Hamburg only contains two references to interdisciplinarity, but they are rather prescriptive. The law states that “universities shall aim at the creation of research profile areas, also those with an interdisciplinarity character”. Additionally, the state law enables interdisciplinary teaching by providing a legal basis for the organisation of teaching across faculty boundaries.

In contrast to Hamburg, the state of Rhineland-Palatinate prescribes interdisciplinary teaching, while interdisciplinary research is merely enabled. The state law demands interdisciplinarity in teaching by, among other, stating that “(t)he curriculum shall indicate opportunities (..) for participation in additional, particularly interdisciplinary courses of the student’s own choice”. Interdisciplinarity in research is not prescribed but enabled by a provision allowing universities to deviate from existing organisational structures in order to create temporary interdisciplinary research units.

Further, Schleswig–Holstein also promotes interdisciplinarity in universities using a mix of enabling and broadly prescriptive policy instruments. Even though the government uses performance agreements with universities in this state, these do not contain specific references to interdisciplinarity. In Schleswig–Holstein, the HE law prescribes interdisciplinarity, yet in a very broad manner, stating that the one university in the state “shall base its structure on the aim of fulfilling its tasks with high academic quality, interdisciplinarily, effectively, and taking into account the principle of economic efficiency”. The state law further provides a definition of master’s degree programmes that enables interdisciplinary teaching and contains legal provisions for the creation of structures with interdisciplinary tasks.

Enabling interdisciplinarity

Only one state, Baden-Württemberg, promotes interdisciplinarity in HE through its state law and takes a purely enabling approach. The state law in Baden-Württemberg provides a legal basis for the creation of interdisciplinary centres and provides a definition of master’s degree programmes which allows for interdisciplinary teaching.

Directed use of policy instruments

In contrast to the states presented above, states with a directed use of policy instruments have little or no references to interdisciplinarity in their state HE laws and use other types

of documents, typically performance agreements with universities, to promote interdisciplinarity. These documents are drafted in what Hüther (2010) refers to as ‘arenas of negotiation’ between universities and the state and the influence of governments vis-à-vis universities varies across and even within the German states. Due to this and due to the vagueness of formulations regarding universities’ obligations (descriptive rather than enabling or prescriptive) in the performance agreements, a valid distinction between prescriptive and enabling provisions cannot be made. Six states – Bavaria, Brandenburg, Hesse, Lower Saxony, Saxony-Anhalt and North Rhine-Westphalia – use a directed approach to promote interdisciplinarity at their universities (see Annex 1 for a comprehensive overview of the characteristics of these universities).

The state HE law of Saxony-Anhalt contains a general encouragement of interdisciplinarity, stating that organisational units shall work together across disciplinary boundaries to fulfil their tasks, as well as a legal provision, which enables the establishment of centres for interdisciplinary research in its state law. Our analysis reveals differences in the way in which interdisciplinarity is promoted through agreements with the two universities in Saxony-Anhalt. While the first, a large and traditional comprehensive university is encouraged to establish interdisciplinary research profile areas and to introduce interdisciplinarity into its teacher training programmes, the plans for the second university, a medium-sized university established in the 1990s do not contain any concrete references to interdisciplinarity.

In Brandenburg, the state HE law enables the creation of faculty-spanning graduate centres to support doctoral education. The formulation of this provision is, however, not clearly linked to interdisciplinarity, but rather seems to enable structural reforms to centralise services at universities. The state promotes interdisciplinarity through individual agreements with its three universities. These agreements show a high degree of similarity, as they all include plans for the building of interdisciplinary research profile areas as well as the collaborative research centres funded by the German research foundation (DFG), which are presented as a means to facilitate interdisciplinary research. Yet, they differ with respect to interdisciplinary teaching, which is promoted for the two comprehensive universities, but not for the technical university.

The state of Hesse provides a rather mixed picture with regard to the promotion of interdisciplinarity at its universities. The state law contains one prescriptive yet broad reference to interdisciplinarity, stating that teaching should take into consideration cross-disciplinary perspectives. Beyond this, interdisciplinarity is promoted through individual agreements with five universities. Only one of these agreements with a traditional, comprehensive university does not contain any references to interdisciplinarity. Two universities, a traditional technical and a young regional university, are encouraged to develop interdisciplinary study programmes to complement the strong disciplinary study offer, and to further develop teacher training to be more interdisciplinary and professionalised. An agreement with a very large traditional comprehensive university, on the other hand, contains references to interdisciplinary research, specifically concerning the application for ‘clusters of excellence’ in the scope of the joint state and federal funding line ‘Excellence Strategy’. Finally, the agreement with the last university, a medium-sized, traditional comprehensive university, strongly promotes interdisciplinarity in both teaching and research.

In Lower Saxony, interdisciplinarity is promoted through agreements with the nine individual universities in the state. These agreements largely focus on promoting interdisciplinarity in research. The agreements with seven universities in Lower Saxony contain concrete goals for interdisciplinarity in research, particularly the creation or strengthening of

research profile areas, the development of collaborative or other interdisciplinary research centres, and the further development of interdisciplinary research centres by developing governance structures and setting financing and target agreements for them. Two of these agreements, both with smaller, regional universities additionally contain references to interdisciplinarity in teaching. The remaining two university agreements contain no references to interdisciplinarity. The state of Lower Saxony does thus use university agreements to promote interdisciplinarity in the majority of its universities, however, no pattern emerges as to which types of universities are targeted.

Bavaria promotes interdisciplinarity through both its state HE law and performance agreements with its nine universities. The state HE law contains two references to interdisciplinarity. In a prescriptive manner, the law states that “faculties are also obliged to cooperate across the university, insofar as this is in the interest of the interdisciplinarity of research, art and teaching or in order to coordinate the range of courses and research foci”. The law further enables interdisciplinary teaching by providing a definition of master’s degree programmes stating that these can either “continue and deepen the subject or extend it in an interdisciplinary manner”. The university agreements promote interdisciplinarity in all but the case of a medium-sized, traditional comprehensive university. In the remaining agreements, we observed a strong focus on research, both in general and including more concrete specifications regarding the disciplinary scope, organisational form, or application for funding for interdisciplinary research. Universities are asked to conduct more multi- and transdisciplinary research, to create platforms to facilitate dialogue and future collaborations across disciplines, to strategically select research profile areas, and create or further develop research centres and apply for DFG collaborative research centres. All but two of these agreements contain references to interdisciplinary teaching, foreseeing, for example, the creation of interdisciplinary research- and problem-based education, and interdisciplinary teacher training. It is striking that the two universities which are not urged to promote interdisciplinarity in teaching have a strong research profile: They are both traditional and prestigious universities which have been labelled excellent universities within the scope of the federal “Excellence initiative” and its follow-up programme, the “Excellence strategy” – programmes providing substantial funding for research with the aim of “strengthen the international competitiveness and visibility of German science” (BMBF, 2019).

The state HE law in North Rhine-Westphalia only contains two references to interdisciplinarity, one encouraging interdisciplinarity in general, one enabling interdisciplinary teaching by providing a definition of HE encompassing the possibility of interdisciplinary study programmes. The performance agreements with the 14 universities refer extensively to interdisciplinary research, and in some cases call for interdisciplinary teaching. Ten out of 14 university agreements in this state contain demands for the creation and further development of research profile areas and research centres, eight of them specifically refer to the DFG-funded collaborative research centres’ funding line. In three cases, clusters of excellence are mentioned along with other funding possibilities for interdisciplinary research. Six university agreements include references to interdisciplinarity in doctoral education, although with different intent. Some agreements aim at fostering interdisciplinary research through the establishment of interdisciplinary graduate schools, while others aim at centralising doctoral education and conveying general and interdisciplinary competences of doctoral students through faculty-spanning graduate centres. Only three university agreements contain references to interdisciplinary teaching, however these are very strong and range from the offer of a *studium integrale* in the scope of which students can freely choose courses from other disciplines and unfold their interdisciplinary potential, via the creation

of a highly interdisciplinary study offer, to the development of a fully “integrated interdisciplinary university”. Interestingly, these universities do not only include two young and regional universities, but also a traditional technical university that has been awarded the title of an ‘Excellence University’. Only the agreement with one university, a traditional, comprehensive Excellence University, contains no concrete references to interdisciplinarity, neither in teaching nor in research.

Hybrid use of policy instruments

Three states, namely Thuringia, Saxony, and Saarland do not fit either of the categories presented above and are characterised by a hybrid use of policy instruments, using a mix of general approaches and approaches directed at individual universities.

Thuringia promotes interdisciplinarity in both the state HE law and individual agreements with its three universities. There are three references to interdisciplinarity in the state HE law. Interdisciplinary teaching is enabled through inclusion of the term into the definition of master’s degree programmes. The law additionally prescribes that all units within universities work together on an interdisciplinary basis to ensure the coordination of teaching, research, and lifelong learning, and urges universities to pursue research profile areas with an interdisciplinary character. Although Thuringia uses individual agreements to promote interdisciplinarity in universities, these agreements show a high degree of similarity and all contain very explicit references to interdisciplinarity in teaching and at least one reference to interdisciplinarity in research. The establishment of research profile areas is mentioned in all agreements except for one with a university, which is already characterised by a highly specialised profile.

In Saxony, the state HE law contains only one reference to interdisciplinarity, enabling the establishment of interdisciplinarity units through a legal provision. All other references were found in the state’s Higher Education Development Plan, which contains both general and directed aims for universities. Concrete aims for interdisciplinarity have been found for only two of the four universities (inter- and transdisciplinary research collaboration, and interdisciplinary formation of students). Yet, general provisions for the establishment of research profile areas imply that the state promotes interdisciplinary research at all its universities.

Lastly, Saarland, a state with only one university, focuses on the promotion of interdisciplinarity in teaching. The state HE law does not contain prescriptive elements but enables interdisciplinary teaching through a legal provision defining competences in decision-making on interdisciplinary study programmes and through a definition of master’s degree programmes, which includes interdisciplinary teaching. The university agreement, on the other hand, contains references with a strongly prescriptive wording concerning the expansion of interdisciplinary teaching programmes, as well as interdisciplinarity in research. It states that “The research potential of the [university] must be optimally utilised and made visible, in particular through interdisciplinary cooperation” and that “(t)he state thus expects that social science expertise will continue to be available at the university across disciplines and faculties and that professorships from different disciplines will continue to be oriented accordingly”.

Discussion

Our analysis reveals that all of the 16 German states promote interdisciplinarity to a certain degree either in their HE laws or in performance agreements between states and their universities. The analysis shows there is no state that does not pay any attention to interdisciplinarity at universities in its HE regulation. However, we observe interesting differences between the states. Based on our analysis, we were able to distinguish between states with a general use, a directed use, and a hybrid use of policy instruments to promote interdisciplinarity in HE. States employing a general use of policy instruments typically promote interdisciplinarity through their state HE laws, which are directed at all HEI within a respective state. Seven of the analysed German states employ a general use of policy instruments to promote interdisciplinarity, whereas Mecklenburg-Vorpommern, Berlin, and Bremen were found to use largely prescriptive approaches, Baden-Württemberg was found to merely enable interdisciplinarity, while Hamburg, Rhineland-Palatinate and Schleswig-Holstein use a mix of prescriptive and enabling provisions to promote interdisciplinarity. Overall, we observe a dominance of prescriptive approaches in states with a general approach to promoting interdisciplinarity in both teaching and research. Enabling approaches are predominantly used with regard to teaching and usually provide a legal basis for universities to change existing organisational and decision-making structures to incorporate interdisciplinarity in teaching and research.

States with a directed use of policy instruments have little or no references to interdisciplinarity in their state HE laws and use other types of documents, typically performance agreements or contracts with universities, to promote interdisciplinarity. Six states, namely Saxony-Anhalt, Brandenburg, Hesse, Lower Saxony, Bavaria, and North Rhine-Westphalia were found to fit into this category. Directed approaches are used to promote both interdisciplinarity in teaching and in research, but focus more strongly on the latter. They usually contain detailed descriptions of courses of action for universities, sometimes even containing references to concrete funding lines.

Finally, a smaller number of states, namely Thuringia, Saxony, and Saarland, were found to use a mix of both general and directed approaches to promote interdisciplinarity in universities.

Our findings show that the state HE laws are used for the provision of legal basis for interdisciplinarity and focus mostly on interdisciplinary teaching, while interdisciplinary research is in many cases, yet not exclusively, promoted through performance agreements. While the first entails a legally binding regulation, the second is usually based on negotiations and tied to funding. Different functional logics of teaching and research might account for this difference (Nickel, 2012): research is conducted in a highly autonomous manner, has a low degree of formalisation, and especially in the German system, the capacity of states to regulate research is highly limited. Teaching, on the other hand, is more formalised and can be better organised and controlled in the context of the German HE system, e.g., through quality assurance and funding mechanisms, or exam regulations (idem., Wilkesmann, 2016).

An analysis by type (old states versus new states, the latter of which were part of the German Democratic Republic until 1990) and size (big versus small) of states reveals that with the exception of Mecklenburg-Vorpommern, new states tend to make directed use of policy instruments to promote interdisciplinarity, thus targeting individual universities. We found small states, especially city-states with a very low number of universities, to make general use of their instruments, which might not be surprising at first, but suggests

that they promote interdisciplinarity not only at universities, but also at other types of HEI. Yet, no clear pattern emerges for the biggest states in terms of size and number of universities: While Baden-Württemberg employs a general and merely enabling approach to promoting interdisciplinarity, Bavaria and North Rhine-Westphalia emphasise interdisciplinarity much more strongly and mainly through agreements directed at individual universities.

Yet, our data shows a certain degree of correspondence to New Public Management (NPM) trends in the German states. Most of the states employing a general policy approach – e.g. Mecklenburg-Vorpommern, Bremen, Rheinland-Pfalz, Berlin, and Schleswig-Holstein – can be characterised as traditional German systems with low influences of NPM, high degrees of academic self-governance (Hüther, 2010) and “Rechtsstaat regime” (Nyhagen et al., 2017) characteristics, thus strong legislative influences. In contrast, the two states considered to be prime examples of NPM implementation in HE in Germany, namely Bavaria and North Rhine-Westphalia (Hüther, 2010), primarily use negotiation-based performance agreements with individual universities to promote interdisciplinarity. This corresponds to observations of a decrease of power of HE ministries *vis-à-vis* external university boards in these states (Hüther, 2010).

Our findings suggest a strong connection between interdisciplinarity and profiling (see Annex 1), which has been confirmed in other studies, e.g., by Kosmützky (2012), who has shown interdisciplinarity to be one of the prominent organisational images employed in mission statements of German HEIs, or Aula and Tienari (2011), who describe interdisciplinarity as an element of reputation building in the making of a ‘world class university’. Additionally, we identified strong references to research funding lines in the examined documents. Predominantly in performance agreements, interdisciplinary research is directly tied to the acquisition of third-party funding. Universities are encouraged or obliged to apply for funding for clusters of excellence of state- and federal co-funded Excellence Strategy, collaborative research centres or graduate schools funded by the DFG. The Excellence Initiative was introduced with the objective of raising the visibility and competitiveness of German research universities in international scientific communities. Against initial expectations, we could, however, not establish clear patterns across states when comparing prestigious research universities, especially those being labelled Excellence Universities, with other types of institutions. In two of the states that strongly promote interdisciplinarity, namely Bavaria and North Rhine-Westphalia, most but not all Excellence Universities are targeted by policy instruments promoting interdisciplinarity. While in Bavaria, policy instruments for interdisciplinarity at Excellence Universities address research only, North Rhine-Westphalia also puts a focus on interdisciplinary teaching. However, other states such as Baden-Württemberg, which hosts many Excellence Universities, employ a general and enabling use of policy instruments and have rather low degrees of promotion of interdisciplinarity.

The variation between different types of documents (state HE laws versus performance agreements) used to promote interdisciplinarity at universities revealed in our study even within individual states could be explained by Hüther’s (2010) notion of ‘arenas of negotiation’, which increasingly determine the relationships between state HE ministries and individual universities, whereas the power of the respective actors varies across and sometimes even within states. The division of power ranges from universities setting their own goals and ministries merely approving them, to ministries determining goals for universities, whereas in most cases negotiations between the actors take place.

Conclusion

This paper provides an overview of the promotion of interdisciplinarity in HE in Germany. Considering the federal organisation of HE in Germany, we conducted a content analysis of HE laws and performance agreements between ministries and universities in all 16 German states and consequently mapped them, distinguishing between states with a general, a directed, and a hybrid use of policy instruments and analysing state HE laws for prescriptive or enabling provisions for interdisciplinarity. The identified variety of policy instruments used across the German states point to the plurality of views among policy makers regarding the organisational autonomy of universities, the varied power differentials of the ministries and different types of universities as well as the variety of beliefs of the benefits of interdisciplinarity in teaching or in research among policy makers. Finally, the promotion of interdisciplinarity across all states points to some extent to the isomorphic effects and policy borrowing, while the diversity of policy instrument types and institutionalisation of the notions of the importance of interdisciplinarity in HE seems to remain varied. Thereby the paper contributes to the extant literature on the complexity of the policy diffusion and policy instrument use in the field of HE. By revealing the diversity of policy approaches used across and within the German states to promote interdisciplinarity at universities, differing by the function of universities, the paper points out how policy makers compartmentalise interdisciplinarity policies. Contrary to what discourses in media and policy suggest, there seems to be no one-size-fits-all recipe for promoting interdisciplinarity in HE policy.

While this paper provides valuable insights into the range and different configurations of policy instruments used to promote interdisciplinarity, it cannot account for their influence on organisational practices in universities. Further research should not only focus on the policy instruments at play in the promotion of interdisciplinarity, but also on processes of policy implementation. Further, the German HE system is known for high professional autonomy, where policies may have limited effect on practices of knowledge production. Further research should thus also examine how and why policies and regulations promoting interdisciplinarity are implemented, which type prescriptive or enabling provisions for interdisciplinarity turn out to be more effective for different types of universities and which role bottom-up processes play in shaping interdisciplinary practices in German universities.

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Data availability All data analysed for this paper is publicly available.

Code availability Not applicable.

Declarations

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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