

## Teaching complexity in public administration across the globe: an overview

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**Abstract:** *As the contributions in this special issue show, there are ample examples of teaching programs at the nexus of complexity and public administration and its sub-fields. However, the examples discussed in this issue do not give us an indication of the extent to which complexity theory or the complexity sciences are taught in curricula worldwide. This contribution presents the results of a thorough internet search to identify those academic programs in political science, public administration and business administration, where complexity sciences are taught in conjunction with all matters public. The search across 193 countries led to selection of 108 programs that corresponded to some or all the defined criteria. We will present characteristics of the selected programs regarding quality of fit, level of studies, field of studies, and type of information about the complexity science approach available on the programs' websites.*

**Keywords:** teaching complexity; global survey; internet search

### Introduction

Christopher Pollitt, in his contribution to the edited volume by Teisman, Van Buuren & Gerrits (Pollitt, 2009), commented that the complexity sciences, while featuring some useful reminders, would remain a fringe interest. Almost a decade has passed since that statement. In the meantime, the complexity sciences have been taken up in different disciplines, including ours. They have proven to be most useful when informing ongoing research practices instead of trying to establish it as a discrete, 'new' science (Byrne & Callaghan, 2013; Byrne, 2011; Gerrits, 2012; Morcol, 2002, 2012; Teisman, Buuren, & Gerrits, 2009; Teisman & Gerrits, 2014). If researchers are more aware of the complexity of social reality, and if they tailor their research accordingly, they may be able to obtain better results.

Our field has always made the argument that there should be a close relationship between research and education, as can be seen in the contributions elsewhere in this special issue. The question then is to what extent this adoption of the complexity sciences in our research has trickled down to teaching programs across the globe. This contribution presents the results of a thorough internet search that was conducted in order to identify those academic programs in political science, public administration and business administration, where complexity sciences are taught in conjunction with all matters public. We first present the research methodology, then show results of the internet search in terms of regional distribution, and characteristics of selected programs.

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## Research Methodology

The internet search was conducted in the period from May 2017 to October 2017 using the Google search engine. Google, while not perfect, was chosen as it is the most commonly used search engine and appears to be relatively effective for this task. To lower the bias in the search results, automatic filtering options for similar results were disabled, and search was conducted anonymously, starting with an empty browsing history for every search attempt separately. Moreover, we considered that popularity bias in the order of the appeared results (due to e.g. PageRank algorithm), had a limited influence the selection of the final list of the programs, as all the results for every search attempt or country were screened regardless of their page rank. Although these attempts could not completely diminish bias in the search results, we do believe that the precautions described were enough to provide approximate number of university programs fitting the target type.

Our search was conducted separately for all 193 countries that are member states of the UN. Those countries that do not appear to offer academic programs at all, or those countries where a located search on Google was not available at the time of our search (e.g. Montenegro) were left out. This resulted in 178 remaining countries. The subsequent search query was designed to include:

1. Field of studies: public administration, public management, policy science, political science, innovation, business, and management. Terms “innovation”, “business” and “management” were included in the query next to other terms closely linked to public administration, as preliminary search attempts provided insight that some programs with the orientation to these topics fit well to the target program. For example, some programs in public management are offered within business schools. We also included complexity science programs that offer specialization in one of the previously mentioned disciplines, e.g. programs that would cover the use of complexity sciences in questions central to our fields. Last, but not least, some programs in disaster (relief) management were also included as they emphasized necessity of complexity theories approach in understanding and managing disasters and emergencies;
2. Level of study: bachelor and master. We didn't include post-graduate programs or PhD programs. While these also constitute a form of education, post-graduate programs usually offer more flexibility to the students, so we cannot ascertain whether the topic mentioned is also actually taught. This is different for bachelor and master programs, where many courses are an obligatory part of the curriculum;
3. Within the programs identified: the inclusion of complexity as a substantive topic. Naturally, many universities advertise their programs by telling how complex the world has become, and how important it would be to enroll in their program. We only included those programs where the term “complexity” was used in course titles and / or in the course description. Listed literature (e.g. a list of mandatory readings) was checked in case of doubt. This allowed us to differentiate programs that incorporate complexity sciences, from programs that just make a cursory reference to ‘complexity’.

This delineation lead to the following search query: "public administration" OR "public management" OR "public policy" OR "\* policy" OR political OR innovation OR business OR management AND masters AND bachelors AND complexity



The query was first deployed in the English language. We also translated the query to Spanish, French, German, Russian, Serbian, Croatian, Macedonian, and Bosnian. Although using queries in other languages most widely spoken in Asia or Africa would enrich the results, we were limited to the languages available in the research team. The translated queries were used to search within Spain, Spanish speaking countries in South America, France and countries where French is in use at the academic level, Belgium, Germany, Austria, Switzerland, Russia, Serbia, Croatia, Bosnia and Hercegovina, and Macedonia. An additional search in Dutch was not necessary because the English query returned the same results. Other languages couldn't be covered, but we aimed to cover most of the main languages used at universities. Upon selection of the preliminary list of programs, every saved link was visited again to check for possible changes in program descriptions or access to websites.

A preliminary list of programs was made based on the fit to the criteria regarding topic, level of studies and presence of the term “complex” on the website. This preliminary list included 517 programs. This list was further cleaned after closer examination of the websites' contents. Programs that included term “complexity” in a way not relating to complexity theories approach were excluded. Additionally, programs that did not contain aspects of the target disciplines were excluded (e.g. some programs from the field of computer science with complexity approach were included in the preliminary list). After these steps, the final list included 108 programs. The selected programs were then categorized based on the target criteria given above.

Following previously listed criteria, target program could be described as a bachelor or master level education program where complexity theories are combined with aspects of public administration, public management, public policy, political science, business administration with a focus on public management, or related disciplines. The question about the quality of fit to the target characteristics could often not be answered with a simple ‘yes’ or ‘no’. We often found programs that seemed to fit well, while not necessarily fully-fledged PA-programs (or public management, policy science etc.). For example, programs in disaster management mentioned above (but not all) were included for that reason. The same goes for e.g. programs in computational social science that would offer courses on both complexity theory and on using that in analyzing issues in public policy, public administration etc. In these situations, when programs didn't fully align with the target description, they were categorized as having a partial fit to the target program. Programs categorized as having a full fit were those that complied with all our requirements (i.e. points 1 – 3, where 1 and 3 were the most important ones). All programs had to be checked manually to find enough clues for the assessment. Both researchers were involved in this as well as in the subsequent coding.

While our search was designed such that we would increase the likelihood of identifying all programs, there were some limitations. Firstly, and as mentioned above, programs advertised in other languages than the ones we had at our disposal, could not be included. As such, we may have missed programs in some countries if they didn't translate their offerings to any of the languages we used in our search queries. Secondly, we depended on the information being publicly available. Some universities required log-in details (e.g. student accounts) in order to access course descriptions. As such, we couldn't assess the contents of those programs and the fit with the criteria. Thirdly, we could only identify and assess those programs where the information was readable and searchable. While we were able to include information given on websites and in (downloadable) PDF and .doc files, we may have missed information relayed in other formats (e.g. in the shape of a .jpg file, e.g. an online poster). Fourthly, we would sometimes be forced to assign a program to both bachelor and master if it appeared that the same or a similar course would be offered at both levels. Our coding might have been less precise in those cases, as websites were not always clear about how courses tied in with programs. Fifthly, some universities would offer the same or similar programs under different headers, e.g. students from two different programs

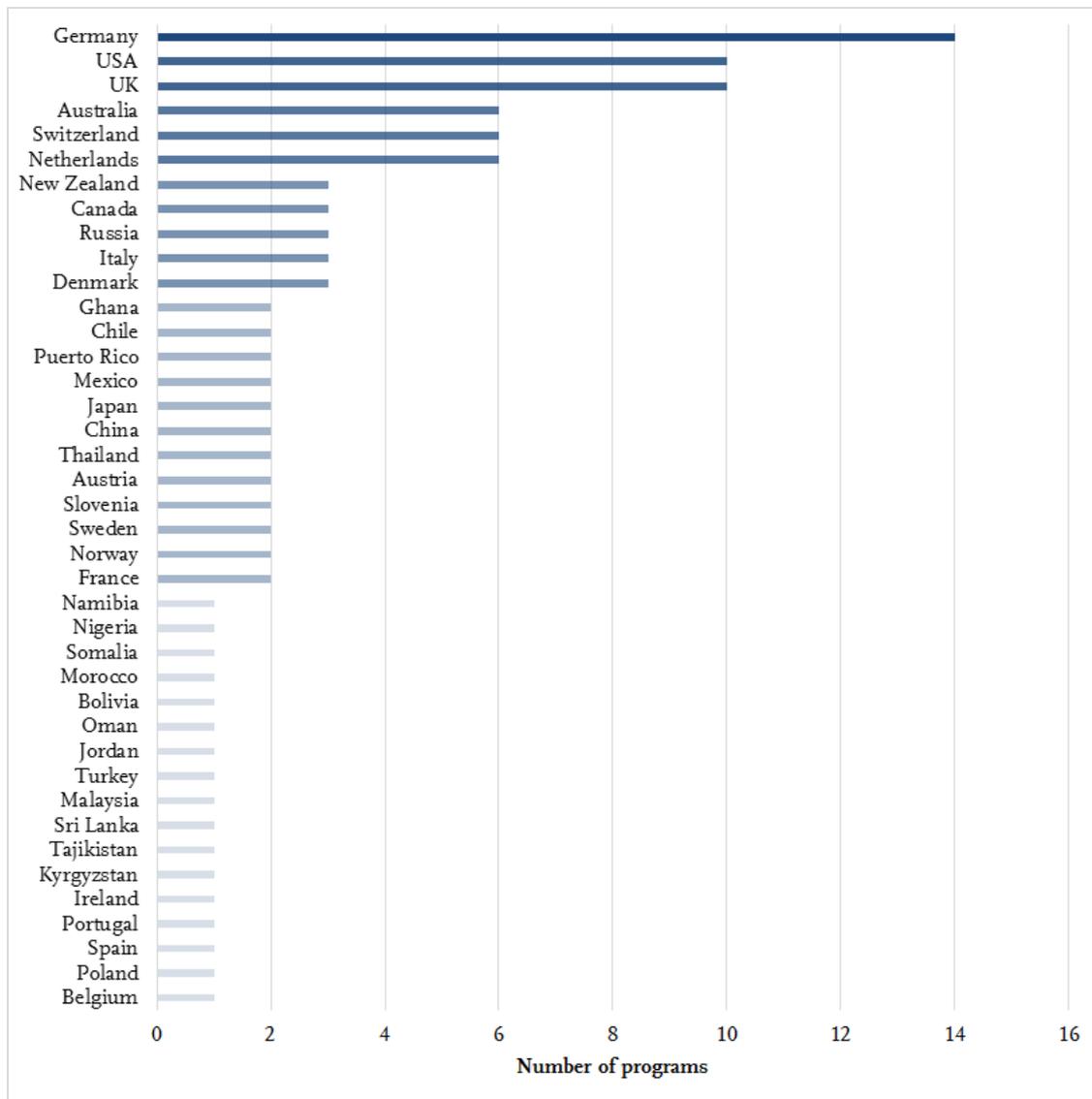
would attend the same course. We couldn't always make out how this was organized at individual universities so, again, some categorization may have been off. Finally, our search was performed on the territory of Germany, and search engine adjusted the results for that to a certain extent, which could possibly explain a richer set of results for the search for Germany. Although the option to allow websites to track the user's location was disabled, this is often not enough to completely hide this information when browsing. For example, programs at German universities, or generally results in the German language, sometimes appeared even when the search was locating other territories (e.g. Asia). In these cases, we ignored those results because they did not result from the search locating precisely Germany.

## Results

### *Regional distribution of the selected programs*

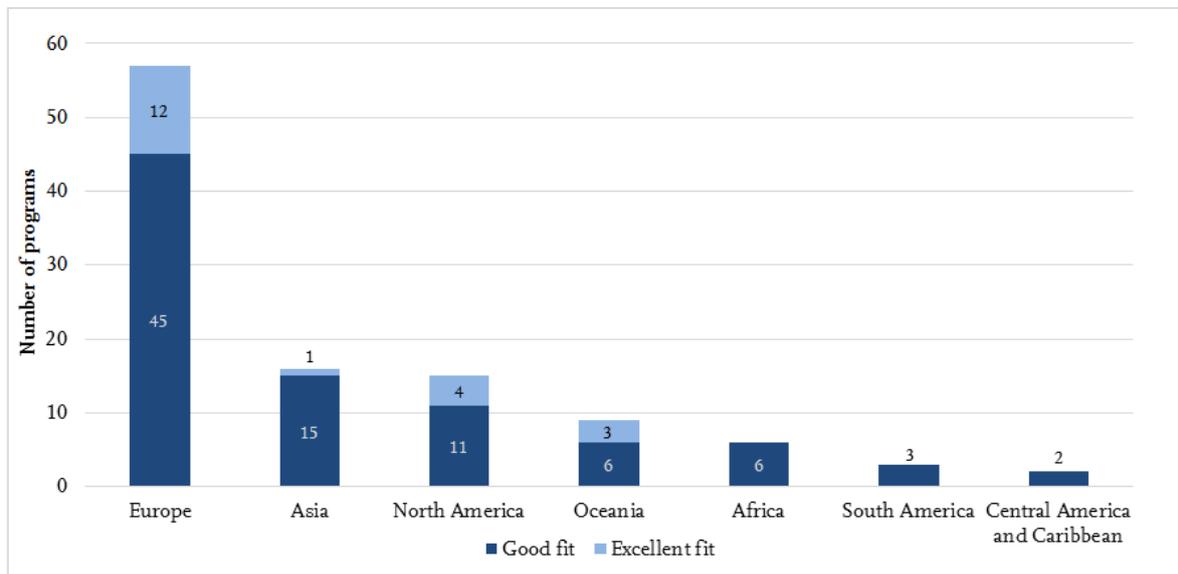
Out of 193 countries where located search was initially conducted, selected academic programs cover 40 countries (see Figure 1). Approximately one half of the selected programs (52.78%) are hosted by universities in Europe, followed by programs from the territory of Asia (14.81%), North America (13.89%), Oceania (8.33%), Africa (5.56%), South America (2.78%), and Central America and Caribbean (1.85%). Countries with the highest number of selected programs include Germany (14 programs), followed by United Kingdom and the United States of America (10 programs each), Australia, Netherlands, and Switzerland (six programs each), Canada, Denmark, Italy, New Zealand, and Russia (three programs each), Austria, Chile, China, France, Ghana, Japan, Mexico, Norway, Puerto Rico, Slovenia, Sweden, and Thailand (two programs each), Belgium, Bolivia, Ireland, Jordan, Kyrgyzstan, Malaysia, Morocco, Namibia, Nigeria, Oman, Poland, Portugal, Somalia, Spain, Sri Lanka, Tajikistan, and Turkey (one program each).

Figure 1. Number of selected programs per country (N=108)



Overall, 20 programs were found to have an excellent fit to the target program type. Most of the best fitting programs were found in Europe (Netherlands, Germany and UK – three programs in each country, Denmark, Sweden, Italy – one program in each country), followed by four programs in North America (USA), three in Oceania (Australia), and one in Asia (Malaysia). The number of selected programs within every continent, including categories of the fit to the target program, are presented on the Figure 2.

Figure 2. Number of selected programs with the good and excellent fit, per continent (N=108)



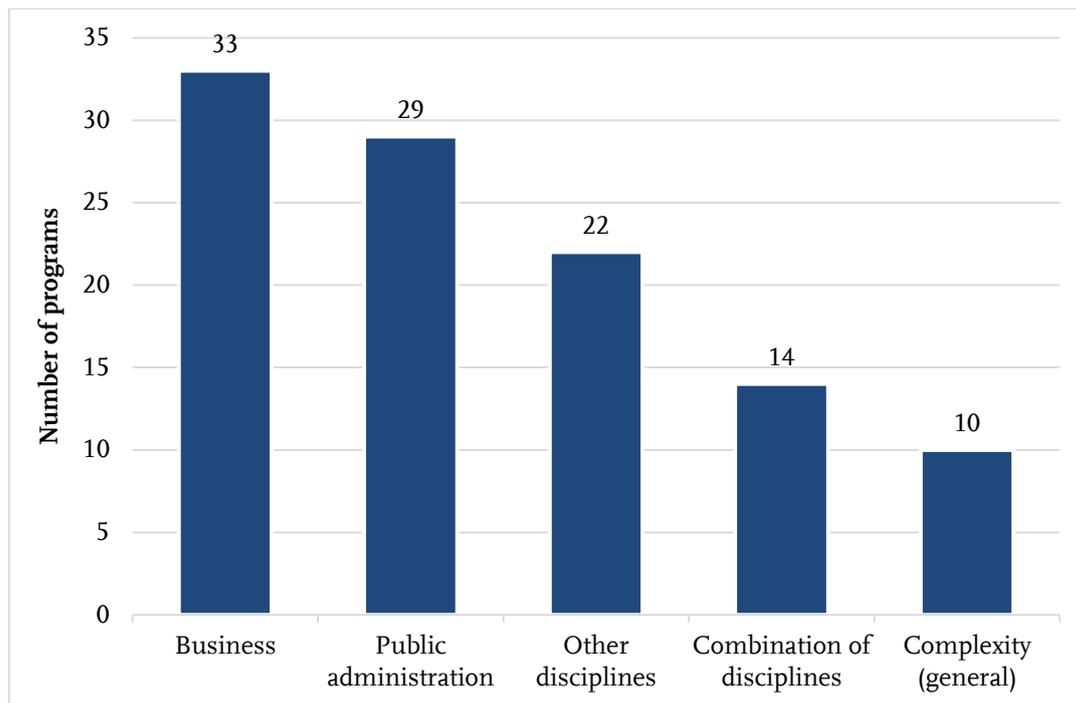
### Characteristics of the selected programs

Most of the programs are on the master level (see Table 1). Close to 60% programs relate to fields of business or public administration, while rest of the programs cover other disciplines (see Figure 3). Lists of the offered courses were available on most of the websites, allowing to check for those introducing complexity theories.

Table 1 Characteristics of all selected programs, and those categorized as excellent and good fit to the target program

		Excellent fit		Good fit		Overall	
		Absolute frequency (n)	Relative frequency (%)	Absolute frequency (n)	Relative frequency (%)	Absolute frequency (n)	Relative frequency (%)
Level of studies	Master	18	90.00	57	64.77	75	69.44
	Bachelor	0	0.00	19	21.59	19	17.59
	Master and bachelor	2	10.00	12	13.64	14	12.97
Field of studies	Political science	9	45.00	20	22.73	29	26.85
	Business	3	15.00	30	34.08	33	30.56
	Other disciplines	2	10.00	20	22.73	22	20.37
	Combination of disciplines	2	10.00	12	13.64	14	12.96
Complexity mentioned in	Complexity (general)	4	20.00	6	6.82	10	9.26
	Course name	2	10.00	28	31.82	30	27.78
	Description of the program	10	50.00	41	46.59	51	47.22
	Both	8	40.00	19	21.59	27	25.00
Course list available	Yes	14	70.00	71	80.68	85	78.70
	No	6	30.00	17	19.32	23	21.30
Total		20	100.00	88	100.00	108	100.00

Figure 3. Number of selected topics per academic field (N=108)



### Discussion and conclusion

We started this contribution with Pollitt's observation that complexity would remain a fringe interest in our field. While we don't have the data to confirm or reject that claim right now, at the very least we can observe that it hasn't disappeared from our realm since his comments. In the light of that point, as well as in the light of this special issue, we wanted to take stock of the state of teaching complexity in education programs in our field. We found that majority of selected programs are from Europe, North America or Asia. The countries with highest number of selected programs are Germany, UK and USA, followed by Australia, Switzerland and Netherlands. Best fitting programs are found in Germany, Netherlands, UK, USA, Australia and Malaysia. Most of the programs are on the master level. Most of them are in the field of business or political science. Regarding the quality of information available on the websites, in most of the cases, information about the complexity approach within the selected programs was available in overall description of the program, or in both description and course name. For almost half of the selected programs, it is not clear whether they could provide training and more in-depth knowledge about complexity even though they do claim to incorporate complexity approach, as there was no indication of specific courses specialized in introducing complexity theories.

As mentioned before, there are some obvious methodological limitations to our overview relating to number of languages used in the search queries, biases linked to the search engine, variety of the sources of information about university programs, and quality and availability of information on the websites. Nevertheless, the chosen methodology provided an approximation of the number of programs we were after. Other possible ways of screening for target programs were considered. More profound search using different sources of information, e.g. extracting list of universities from well-known complexity science institutes, departments, conferences, and

journals, would account for possible misses of well-fitting programs whose websites didn't include key words present in used search query.

These caveats aside, the overview provided is a first. It tells us that complexity within public administration programs is being taught in quite a few places across the globe. It would be interesting to conduct this search again in about 5-10 years to identify a change in the number of programs, which could possibly tell us something about the trajectory of the perceived relevance of complexity for students and practitioners in our field.

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