What Do Learning Scientists Do? A Survey of the ISLS Membership

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Abstract: This study responds to an often asked question, what do learning scientists do? Earlier attempts to answer this question came from a need to define a new field of educational research. However, as we have grown into a robust and highly productive society, self-referential methods for describing the membership is prudent to gain a more accurate understanding of where, for whom, and what kinds of learning sciences research and practices take place. Here we report on the responses of 253 ISLS members from a survey conducted in 2014. We discuss implications of the findings in terms of the types of impact learning scientists have, how we might use these results for advising prospective students, and ways that we might use this to create our future.

Keywords: learning sciences, community, members, research fields

Introduction

What do learning scientists do? Earlier attempts to describe the learning sciences (e.g., Kolodner, 2004; Nathan, Rummel, & Hay, forthcoming; Sawyer, 2014) have come from a need to distinguish the field from other areas of educational research. Such characterizations have served important roles for defining a more nascent field. However, as we have matured, it becomes important to define ourselves in terms of what we do rather than in terms of differences with other fields. Evidence of this maturity is found in ISLS having two high impact flagship journals, two robust international conferences, a quarter century of scholarship since the launch of the *Journal of the Learning Sciences* (JLS), and learning scientists connected in large numbers across the globe. It now seems prudent to let the learning science membership define what we do as an educational field. Such self-referential activities are common in social systems. Following Luhmann (1990) we apply the term autopoiesis as a rationale for understanding our field in this way. Autopoietic systems are, "networks of productions of components that recursively, through their interactions, generate and realize the network that produces them and constitute, in the space in which they exist, the boundaries of the network as components that participate in the realization of the network" (p. 3). Taking stock of how organizations and fields evolve and self-organize provide lenses for which to understand centers of gravity and boundaries, while at the same time providing insights into limitations and possible directions for growth. We argue that now is that time to take stock. In this report, we present the results from a membership survey aimed at understanding the breadth of research, practices, methods, and occupations, articulated by members of the *International Society of the Learning Sciences* (ISLS) as of 2014. We believe that the results will have great utility in a number of institutional and professional activities including recruitment of graduate students, degree-bearing program development, and identification of potential areas of research interest, gaps, and growth.

Earlier efforts to define the Learning Sciences

Kolodner (2004) notes that in establishing *JLS*, she wanted to create a venue for cognitive scientists of all kinds to publish research about learning in real world settings and about big ideas in learning. The inception of JLS signaled the arrival of a new and growing field of educational research. Over the years, the learning sciences (LS) field has moved from being largely cognitive science focused to one that more fully integrates social and cultural theories. The Learning Sciences, while still drawing on other methodologies, has also developed design-based research as its signature research methodology (e.g., Bielaczyc, 2006; Brown, 1992). The field in general has defined itself with a focus on learning in complex domains with an interest in the dialectic between theory and design—using theory to guide design and enactments of those designs to guide theory (Bielaczyc, 2006).

From the proceedings of a workshop aimed at defining the learning sciences and the implications of such a definition for graduate education, Nathan, Rummel, & Hay (forthcoming) open with four themes they considered to be central contributors to the development of the learning sciences field. These included (1) the design of learning environments and practices, (2) use-inspired basic research, (3) using authentic practices and settings to test hypotheses, and (4) an engineering ethos that envisions new practices and resources to support learning. Delving into the specifics of the themes, among the interesting findings that emerged from workshop discussions were challenges in what was termed "branding" the learning sciences along disciplinary and methodological lines that has implications for the hiring and tenure processes. Another challenge that emerged was the difficulty in

explaining to prospective students what the career paths are for those with LS degrees. We take up some of the challenges raised in that report in the present study.

Recently, in the introduction to the 2nd edition of the *Handbook of the Learning Sciences*, Sawyer (2014) summarizes various research foci that have historically characterized learning sciences research such as the importance of anchoring learning events in prior knowledge, the role of expert knowledge, learning through social interaction, the role of design and application in scaffolding levels of understanding, and technological supports for building knowledge. Teaching and learning in schools is also heavily emphasized. However, quite apart from what is described as "The New Science of Learning," a number of these strands have evolved beyond their historical roots with nuanced approaches, designs, and environments that blur the boundaries of where, for whom, and what kinds of LS research and practices take place. Here, surveying the membership can provide a more accurate picture of what the field does and how we conceptualize our own LS identities. Next we describe the methods and findings of the ISLS membership survey.

Methods

The survey was commissioned by the president of ISLS in the year 2014 (second author) and charged to the chair of the ISLS Membership Committee (first author) to conduct. The process of constructing the survey was collaborative and iterative. First, the president and chair met to discuss potential questions. Next, a small team of Membership Committee affiliates worked to provide details and refine the survey. Categories of research and scholarship were taken from existing application protocols for ISLS membership as well as conference proposal taxonomies for reviewing. A final draft was sent to the full Membership Committee and the ISLS Board of Directors to vet and revise. In January 2014, the draft survey in Survey Monkey was piloted with approximately 20 learning scientists who worked in various known LS-oriented organizations, e.g., research scientists at SRI, university professors, graduate students, and post-doctoral fellows. Responses in the pilot phase were reviewed by the small team of Membership Committee affiliates (see acknowledgements), revised, and then sent out for a final review with the full Membership Committee. The final survey was sent out through the ISLS listserv on February 5, 2014 with multiple periodic email reminders over the course of 2 months. In total, 253 people responded to the survey out of a possible 450 members, which constitutes 56% of the membership.

Survey questions

The survey was comprised of 32 multiple choice, fill in the blank, short answer, and drop down menu questions. Members responded to only the subsection of questions that pertained to the kind of job they did, e.g., professor, student, research scientist. Table 1 provides a modified version of the survey questions completed by professors.

Table 1: ISLS Membership Survey 2014 questions for professors

1.	Do you consider yourself a learning scientist?	*10.*	Do you advise students who are doing LS research?
2.	Do you see the work that you do as related to LS?	*11.*	Of the masters students in the last 5 years, list their current occupations.
3.	Please select the category that best fits your career status.	*12.*	Of the doctoral students in the last 5 years, list their current occupations.
4.	What is your rank or job title?	*13.*	On average, how many students do you advise who are doing LS research each year?
5.	What is the name of the department in which you work?	*14.*	Please indicate your areas of [domain] interests (selected from 24 choices, e.g., Computer Science, Learning Technologies, Psychology).
6.	What is the name of the department where you obtained your doctoral degree?	*15.*	Please indicate the primary methodological approach (e.g., quantitative, qualitative, mixed methods)
7.	Did you receive your degree from an LS program?	*16.*	Please indicate your research focus (selected from 39 choices including "other", e.g., Assessment, Gender, Scaffolding).
8.	What were your research interests while you pursued your degree?	*17.*	Please indicate the contexts of your work (e.g., informal learning settings).
9.	What are your current research interests?	*18.*	Please indicate the main population of your research.

Analysis

For multiple choice, fill in the blank, and drop down menu questions, frequencies of responses were tallied and reported. For short answer questions, responses were qualitatively mined to find general population categories

and trends. Category descriptions were negotiated by the small team of Membership Committee affiliates.

Findings

Table 2 summarizes key findings for the global population surveyed in terms of occupation, rank, degree and advising. This is followed by more detailed findings for questions about masters and doctoral student occupations, domain interests, methodologies, research foci, contexts, and populations.

Table 2: Combined population survey responses for occupation, rank, degree, and advising

Question	Response	Frequencies	Percentage
Combined Population		**253**	
Considers himself/herself learning scientist	Yes	230	90.9
	No	23	9.1
Current job status	Work in academia (e.g., professor, lecturer, post-doc)	160	63.2
	Professional staff working in academia (e.g., researcher, evaluator, project manager)	19	7.5
	Professional staff working outside of academia (e.g., SRI, Google, a museum)	27	10.7
	Doctoral student	47	18.6
	Master's student	0	0
Academics (e.g., professor, lecturer, post-doc)		**160**	
Current Rank or title	Full Professor	40	25
	Associate Professor	39	24.4
	Assistant Professor	33	10.6
	Non-Tenured Associate Professor	3	1.9
	Lecturer	7	4.4
	Post-Doctoral Researcher	13	8.1
	Other/Unspecified	25	15.6
Received degree from a learning sciences program	Yes	55	34.4
	No	105	65.6
Advise students doing learning sciences research	Yes	109	68.1
	No	51	31.9
Average number of students advised per year	Masters	Average: 3	
	Doctoral	Average: 3	
Professional staff in or outside academia (e.g., researcher, museum)		**46**	

As expected, a majority of respondents (63.2%) reported working in academia as professors, lecturers, post-docs, or doctoral students. However, we were surprised to see that nearly one-fifth of the members who responded worked as professional staff in and out of the academy. Of those who said that they worked in academia, not surprisingly, only 34.4% of the respondents said that they received their degree from a learning sciences program, however, a majority of them said that they advised students who are doing learning sciences research. This has implications for the specificity and need for learning sciences programs offered.

To obtain an understanding of what learning sciences masters students do, the specific wording of the question was, "Of the MASTERS students whom you directly advised in the last five years, please list their current occupations to the best of your knowledge." Similar wording was used for doctoral student occupations. Figures 1 and 2 shows the distribution of responses. For masters students, occupations included data analyst, game designer, financial analyst, banker, human resources development, and restaurateur. For doctoral students, interesting occupations included running a start-up company in digital media, leader of an educational NGO, instructional tech support in higher education, and assistant secretary of education. Of particular interest is that the largest number of former masters students are K-12 teachers.

Figure 3 shows what the membership revealed about their domain interests as delineated in four categories of *Academics*, *Doctoral Students*, *Professional Staff in Academia*, and *Professional Staff Outside of Academia*. Not surprisingly, the categories of *Learning Environments Design*, and *Learning Technologies* were mentioned the most followed by higher frequencies in the categories of *Curriculum*, *Social Sciences*, and *Professional Development*. However, there were nearly 40 responses in the *Other* category, which included Dentistry, Philosophy, Architecture, Acupuncture, Measurement, and Civic Engagement. Similarly, Figure 4 shows the details about the membership's research foci. Again not surprisingly, we see high frequencies in the categories of *Collaborative knowledge building*, *Inquiry learning*, *Communities of practice*, and *Computer*

supported collaborative learning. The *Other* category included open education, social computing and epistemic feedback.

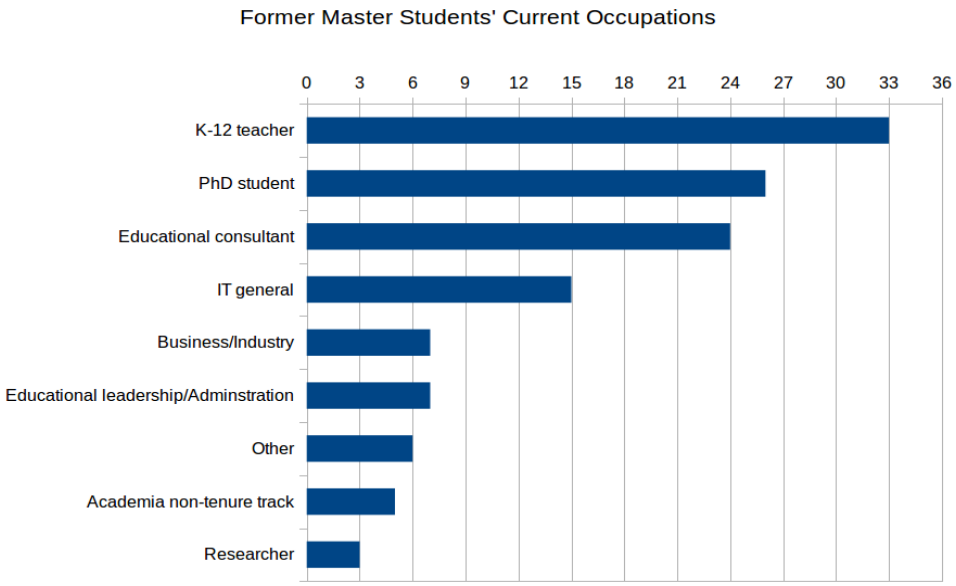

Figure 1. Masters Students' Current Occupations.

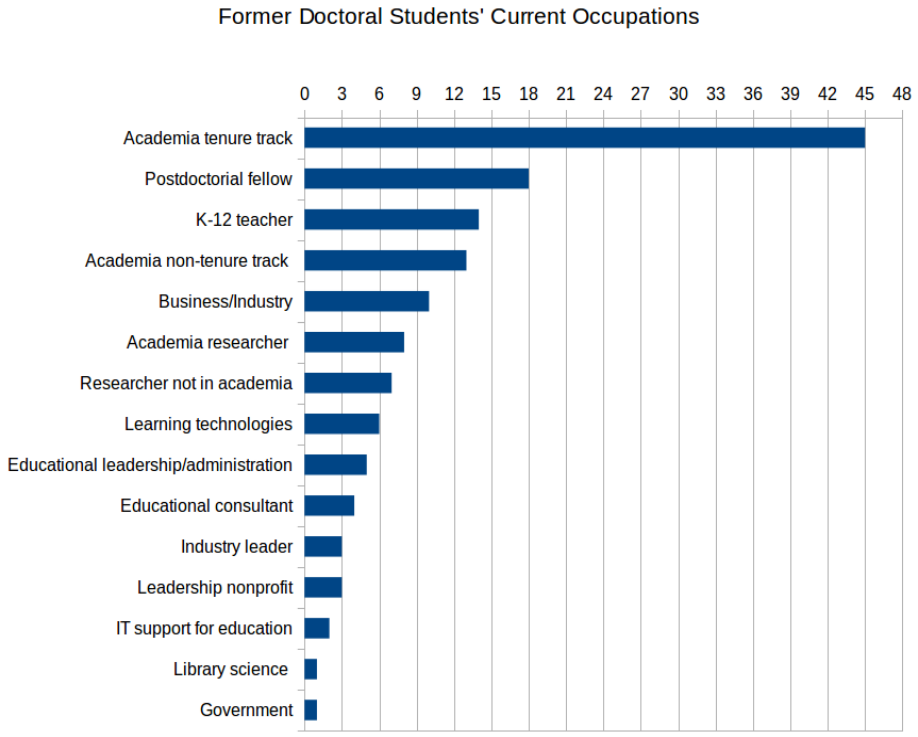

Figure 2. Doctoral Students' Current Occupations.

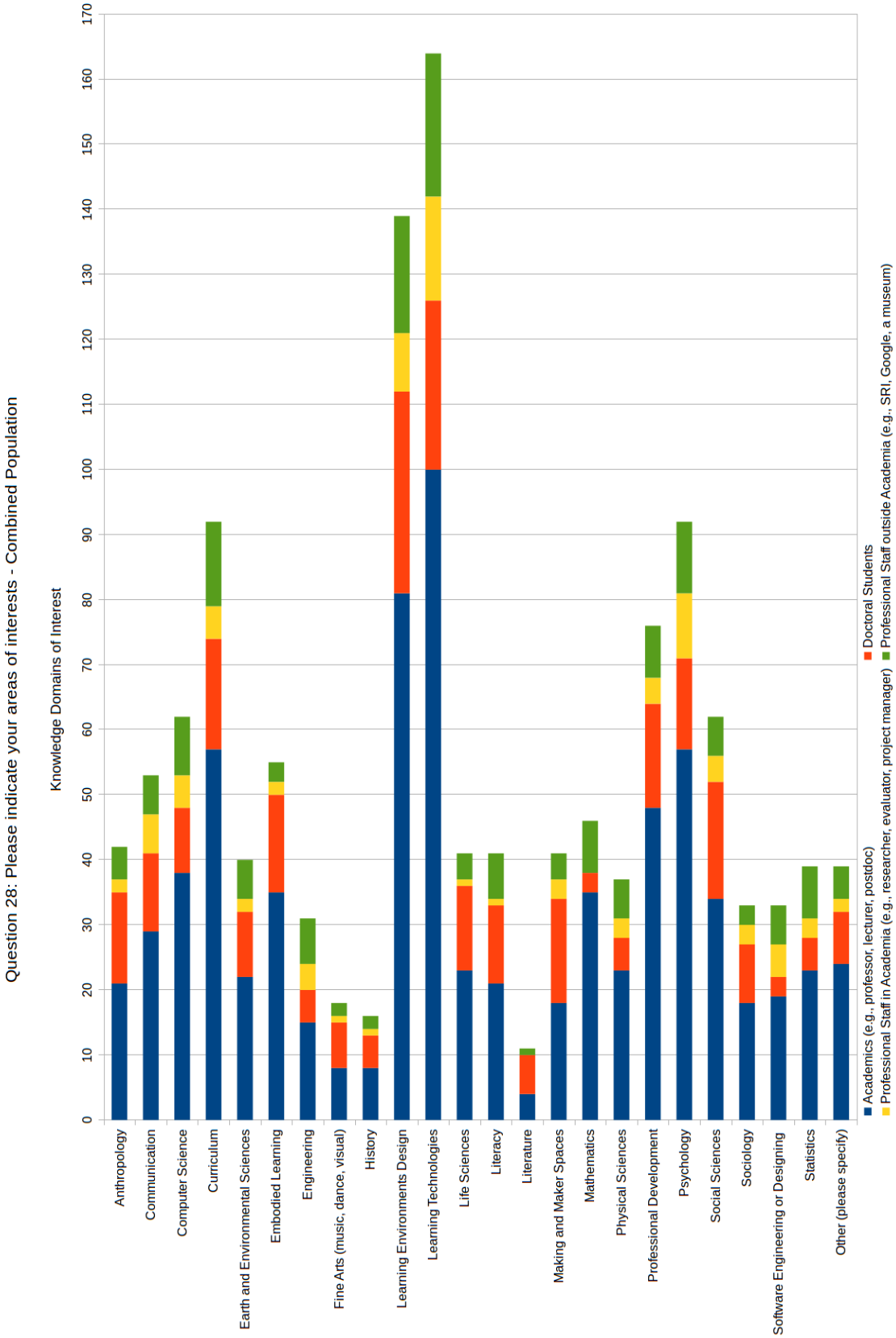

Figure 3. Combined Domain Interests.

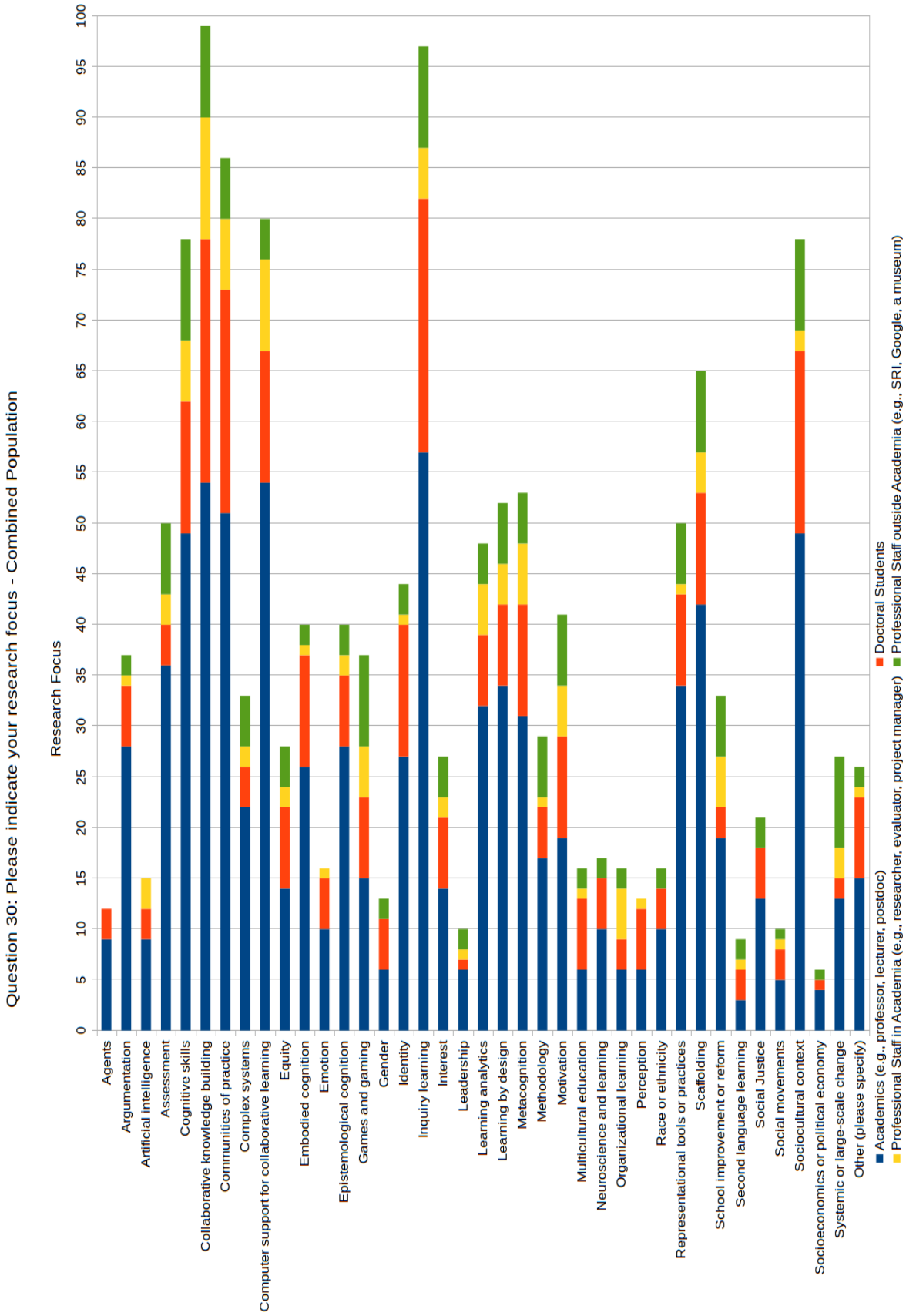

Figure 4. Research Foci.

With respect to the question on the primary methodological approach, about 53.8% of respondents said that they used mixed methods, and 23.3% said that they used qualitative methods. Just 3.6% said that they used quantitative methods only and of those there were no doctoral students represented. Another 1% said that they used other methods and about 10% did not respond.

About half of the membership surveyed (49.4%) said that they work in formal learning settings. Working only in informal settings was indicated by 7.1% of the membership followed by 28.4% working in both formal and informal, and 4.3% working in other learning settings that included medical education and training, life long learning, technical education, work sites, and everyday settings.

Finally, Figure 5 shows the distribution of populations survey respondents said they worked with.

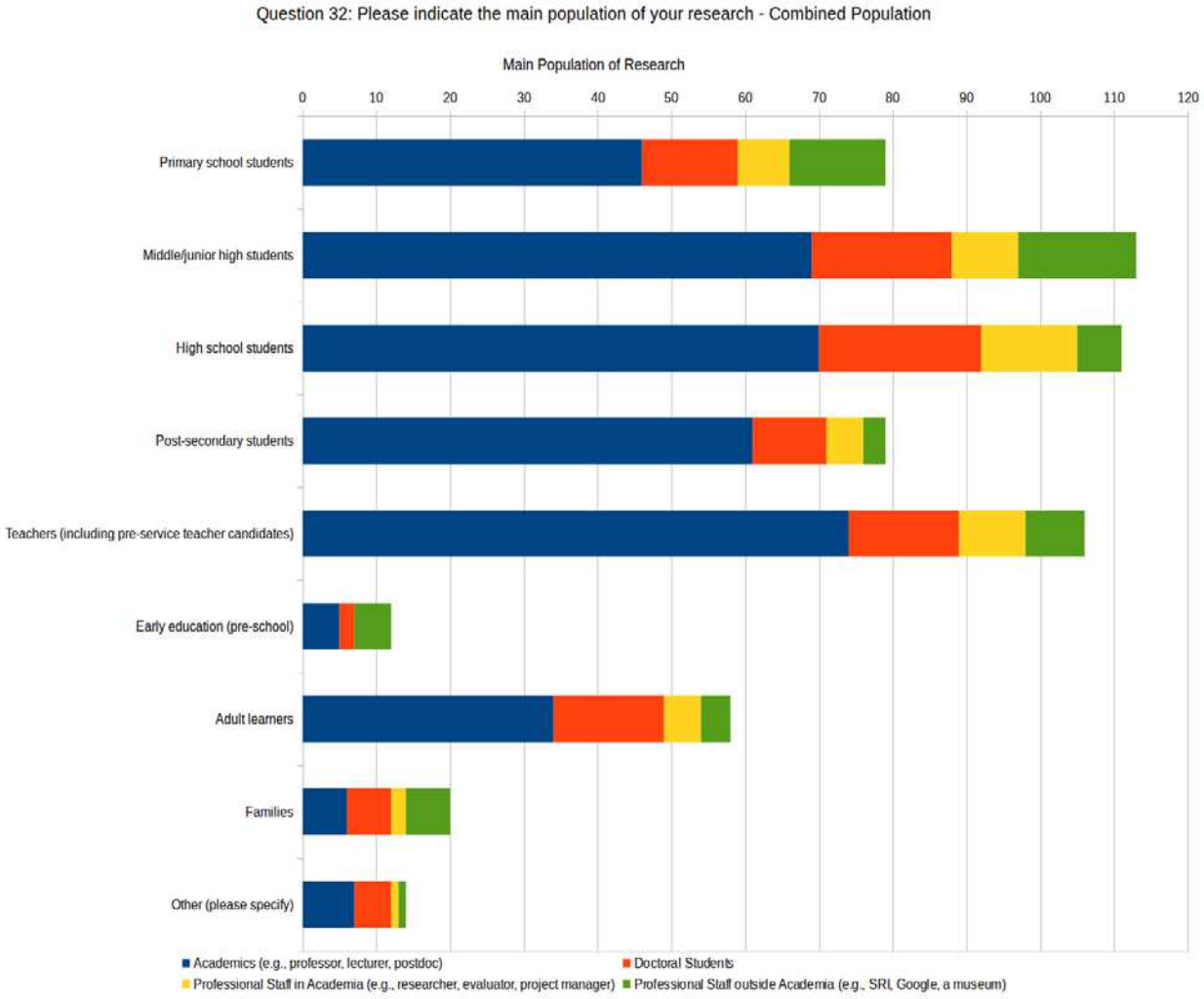

Figure 5. Main Population of Research.

We can see from the graph that a large portion of survey respondents work with students. However, we were surprised that nearly half said that they worked with teachers. We were also surprised at the numbers of people working with adult learners (23 percent) and with families (8 percent). Responses in the *Other* category included physicians, nurses, health professionals, disabled persons, and front-line youth workers. This suggests that other than early education, learning scientists work with learners across much of the life span.

Conclusions and implications

Acknowledging the autopoieitic nature of the LS, the survey aimed at investigating how the LS field has self-organized. Our first answer to the question "What do learning scientists do" is that we do quite a bit. But the results of this survey provide suggestions that are more nuanced than that in terms of how LS has grown as a field, the types of impact learning scientists have, how we might use these results for advising prospective students, and ways that we might use this to create our future. The first point of note is that while many of the faculty do not have learning sciences degrees, the students they advise are in learning sciences programs—this is consistent with the growth of learning sciences programs internationally (e.g., see NAPLeS at http://isls-naples.psy.lmu.de/).

A second point of note is the diverse settings in which learning scientists work—that provides both evidence of impact and information that we can use to advise prospective masters and doctoral students. For masters graduates, K-12 schools are a frequent place of employment. This is particularly interesting because this is one mechanism for learning sciences inspired theories and designs to have an impact on practice. It is also clear that another place where learning scientists are influential and provide possible career paths are in informal settings, disciplinary education (e.g., medical, dental education), and in the private sector such as game design.

The third point answers directly the question posed in the title of the paper. Many learning scientists take a traditional route through academia, but at both the masters and doctoral levels, the survey results show that there are other pathways as well – as consultants, in information technology fields, in non-profit and research organizations, for example. Most learning scientists, not surprisingly have interests in learning environments design and learning technologies but beyond that, they work in a range of disciplinary fields. Learning scientists are also involved in professional development and curriculum, which goes along with developing learning environments and technologies, which after all, are embedded in curriculum and the need for professional development support. One question that is not addressed here is the degree to which teachers are engaged in participatory design. The survey results also show that a substantial number of learning scientists are working in emerging areas such as embodied learning and makerspaces. In addition, it shows the range of research methods used: most LS researchers are using mixed methods rather than purely quantitative or qualitative methods. Together these findings are particularly important as LS programs market to potential students, make decisions about faculty hires, or advise current graduate students.

Finally, it is important to think about how the results of this survey can help the learning sciences create our future in line with autopoietic systems. In ISLS Board meetings, one question that has arisen is whether we need special interest groups for various sub-communities. While this survey cannot answer this question, it suggests some possible areas such as informal learning and other outside academia contexts. It might also suggest ways that the society can help with brokering, or at least making visible, different forms of expertise so that new and productive collaborations might form. To support continual growth of the society, connections can also be made between organizations that overlap with membership research and interests such as the Association for Educational Communications and Technology (AECT), Learning Analytics & Knowledge (LAK), the National Association for Research in Science Teaching (NARST), the European Association for Learning and Instruction (EARLI), and Computer-Supported Cooperative Work (CSCW). We hope that these results will help current and future learning scientists envision a range of possible futures.

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