The Teaching and Research Nexus in Turkish Academia: Lessons from an international survey

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Abstract. With the Humboldtian idea of university, the research-informed teaching has largely influenced university models all around the world since 19th century. Recent models, however, seem to more emphasize the role of research through entrepreneurial mindset and bring questions about the connections as well as controversies between teaching and research activities of academics. Utilizing related questions of an international survey, this study aims at shedding light on the teaching and research nexus in Turkish academia by focusing academics' main activities and orientations. Our findings indicate that while Turkish academics have positive perceptions on the teaching and research nexus, rapid expansion in higher education and competitive global trends may have an influence on the academic profession, bringing contradictions regarding the interplay between teaching and research activities. We discuss our findings through the national changes and global trends in higher education and conclude with recommendations on enhancing the nexus between teaching and research.

Keywords: academics, academic profession, research and teaching nexus, Turkish higher education

Introduction

Over the changing times and within emerging social, political, economic and cultural contexts, missions of universities have been explored from various perspectives including national development, internationalization, democratization, community service, public impact and advancement of citizenship and social justice (Altbach, 2008; Harkavy, 2006; Scott, 2006). Yet, independent of time and context, there are two missions, teaching and research, which have always been at the forefront of discussions even though the emphasis institutions placed on each one differed depending on internal and external factors.

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Early institutions of higher education such as the Confucian schools in China, religious schools in Islamic world and temple schools in America before Columbus focused on the importance of teaching. Transmission of the knowledge to train the community of elites including religious and political leaders was the primary aim (Perkin, 2007). This trend continued in Medieval times with the establishment of universities in Europe. The emphasis was still on teaching, with the aim of equipping particularly undergraduate students with the knowledge necessary to become priests, managers, and professionals that the society needed at the time (Cobban, 1992). The mission of research was deemed important to pursue truth and create knowledge, but it was not the formal nor primary mission (Scott, 2006; Chaplin, 1977). Later, in the 19th century, the Humboldtian idea of university introduced a balanced role between research and teaching in higher education and influenced university models all around the world (Nybom, 2003).

In the 20th century, a specific importance was attributed to the mission of research in the context of higher education. This was mainly due to the fact that universities were seen as vehicles for national development, and research conducted in higher education institutions (HEIs) contributed towards this aim (Scott, 2006). The mission of research was emphasized further when "The Carnegie Classification was developed in the early 1970s by the Carnegie Commission on Higher Education to serve its policy research needs" (McCormick, 2001, p.9). In this classification, colleges and universities were categorized according to their engagement in research and teaching. Research-based institutions focused heavily on graduate studies, creation of knowledge and dissemination of research output by means of publications. The weight of research has further risen in many countries because of the increasing marketization, globalization and research role of the university in the knowledge-based society. The entrepreneurial university movement, furthermore, has led higher education institutions all around the world to produce applicable knowledge for the society as well for themselves and given rise to domination of research in university roles (Marginson, 2006; Slaughter & Rhoades, 2004; Uslu, Calikoglu, Seggie, & Seggie, 2019).

In this axe of teaching and research engagement, it is possible to categorize university models as institutions with (i) a strong emphasis on research, (ii) a balanced teaching and research, and (iii) a strong emphasis on teaching (Arimoto, 2015). Results of a large international and comparative study, Changing Academic Profession (CAP) 2007, conducted around the first decade of the millennium, indicated that the number of countries in institutions with research focus increased, while the numbers in both teaching oriented and balanced research and teaching decreased (Arimoto, 2015). One main reason for this increase in research focus is the shift of industrial society to knowledge society where discovering and building knowledge to inform action and contribute to the development of science and technology becomes utmost important (Arimoto, 2015). However, the increasing diversification in the student body and emerging needs for learner-centered education as well as the needs of the knowledge society have brought a variety of demands in terms of not only research but also teaching (Johnson et al., 1999).

Institutions have now been asked to diversify their teaching and research activities and combine and link teaching and research, in other words, create a Teaching-Research nexus (T-R nexus) for quality learning that would equip students with relevant skills and competences for the 21st century complex challenges (Brew & Boud, 1995; Coate, Barnett, & Williams, 2001; Geschwind & Broström, 2015; Taylor, 2007). In addition, a new academic paradigm, socially engaged scholarship, enforces academics to become not only producers of the knowledge, but also active participants of change in society by disseminating knowledge to public audience and professional world (Beaulieu, Breton, & Brousselle, 2018). This changing role of academics also forces universities to create new partnerships and collaborate with various stakeholders outside their campuses. The more these needs put pressure onto universities, the more academics have also been pressured with relation to their research and teaching orientations and activities including T-R nexus in order to meet the expectations of their students, institutions and stakeholders outside academia. As all academics around the world, Turkish academics have been influenced by these global trends with increasing demands in terms of diverse teaching and research activities and T-R nexus in the institutions. Given these changing circumstances, however, there is, to the best of our knowledge, no research examining teaching research activities with a focus on T-R nexus in Turkish higher education. Furthermore, Turkey recently set a target of becoming one of the ten biggest economies in its centenary date, 2023 and started to formulate its policies accordingly. Considering the critical role of higher education as one of the primary sources of knowledge production and science and high-tech development on the way to knowledge society, the number of higher education institutions has tripled in two decades. In such a rapidly growing higher education system, it is also important to examine the ways in which the perceptions of research, teaching and T-R nexus are reflected in Turkish academia. This study aims to fulfill these gaps by utilizing the related questions of an international comparative survey, namely Academic Profession in the Knowledge-Based Society (APIKS), that was also administered to academics employed in Turkish HEIs. Accordingly, our paper aims to examine i) the perceptions of Turkish academics in terms of T-R nexus and ii) the general characteristics of their teaching and research activities within the case of a fast-expanding higher education system.

Literature review

This section first explores what is meant by T-R nexus and documents some of the major research findings in terms of the perceptions of academics about the ways in which T-R nexus exists in their institutions. It then presents an overview of the current Turkish higher education system and the trends that emerge in academic work and roles in terms of teaching and research.

Teaching and research nexus

The idea that teaching and research nurture and nourish each other and such a relationship should exist in an ideal university goes back to Alexander von Humboldt (Teichler, 2010). The close link between teaching and research is usually referred as the T-R nexus. Lately, the symbiotic relationship between the two has been a topic of discussion (Hancock, Marriott & Duff, 2019). Some scholars argue that research and teaching cannot exist without each other and involvement in one would serve the other (Zimbardi & Myatt, 2014; Zubrick, Reid & Rossiter, 2001). However, others like Hattie and Marsh (1996) who found almost zero relationship between research and teaching in their study claim that research and teaching do not have a mutual link. Literature (Brennan, Cusack, Delahunt, Kuznesof, & Donnelly, 2017) highlights that the interplay between teaching and research can be discipline-dependent (e.g., Griffiths, 2004), institutional type or departmental context-bound (e.g. Barnett, 2003; Brew, 2006; Healey, 2005) and level of study-related (e.g., Neumann, 1992).

Even though sometimes academics cannot make clear cut differentiations between teaching and research (Zamorski, 2002) or students cannot recognize research embedded into teaching (Vereijken, van der Rijst, de Beaufort, van Driel & Dekker, 2018), it is still possible to categorize the relationship between teaching and research in several ways such as research-led teaching where latest research is integrated into course design (Griffiths, 2004) or research-tutored teaching where students discuss issues related to research (Jenkins & Healey, 2005). Neumann (1992) also classified the interplay between teaching and research in three groups, namely, the (a) tangible connection where the cutting edge knowledge is transmitted; (b) intangible connection where a culture of appreciation for research is created both for students and academics; and (c) global connection where the link is not only created at the individual level, but also at the departmental level (p.162). One point to note is that all these categories tend to overlap, interrelate and are not always distinguishable (Griffiths, 2004; Neumann, 1992).

Regardless categorization, one can claim that academics are now expected to more establish linkages between their efforts of teaching and research, since students in the 21st century seek more blended learning environments in higher education (Geschwind & Broström, 2015). Linkages between teaching and research tend to increase, including the use of own research conducted into teaching courses; integration of the research activities into assignments, involvement of students into research projects and teaching research methods throughout various subjects (Baldwin, 2005). However, as the most cost-effective way of teaching crowded classes, lecture is still argued to be the main teaching method in the context of higher education (Horgan, 2003). Therefore, to increase student motivation and learning considering diverse student bodies and their learning styles, new teaching methods enabling use of different research-related processes, media and technology, involvement in program development initiatives and a project-based approach are highly desired (Fry, Ketteridge, & Marshall, 2003; Zimbardi & Myatt, 2014).

In the CAP 2007 project survey, the perceptions of academics highlighted a favorable position for the T-R nexus with three-quarters of the survey participants being interested in a nexus. Korea and

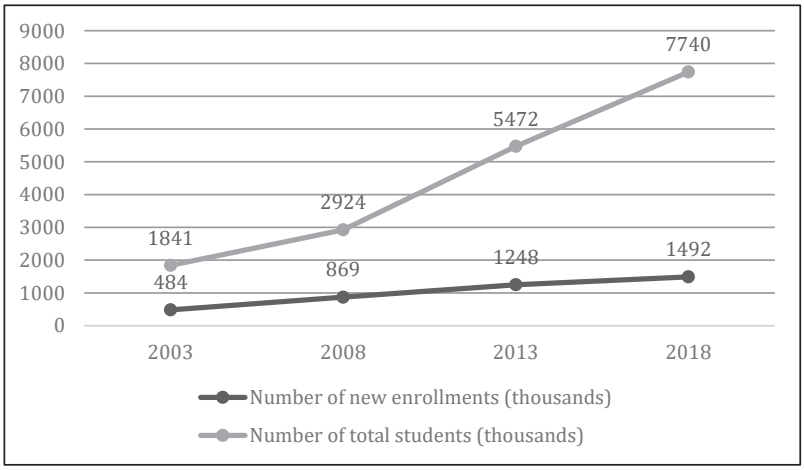
Italy along with several emerging economies heavily emphasized (more than 80%) the nexus as opposed to Finland, Germany, Norway and Australia among others where the nexus was underemphasized. Findings of this study also indicated that those emerging countries where the nexus is emphasized lean towards both research and teaching while most advanced countries where the nexus was underscored lean towards research only (Teichler, Arimoto & Cummings, 2013). This study, however, contributes to the literature highlighting the place of Turkey in T-R nexus as an emerging economy and not a CAP 2007 project country.

Turkish higher education system

Turkish higher education has a highly centralized system. The Council of Higher Education, Turkey (YÖK) is mainly responsible for planning, coordination and supervision of higher education institutions (Akbulut Yıldırmış & Seggie, 2018). In the last 15 years, there has been a rapid expansion in Turkish higher education regarding both university numbers and student capacity in existing institutions. In 2003, there were 77 higher education institutions with 54 state and 23 foundation universities. In 2019, however, the system included 206 higher education institutions with 129 public and 72 foundation universities as well as 5 vocational schools (YÖK, 2019). This massification is summarized in Figure 1 and 2.

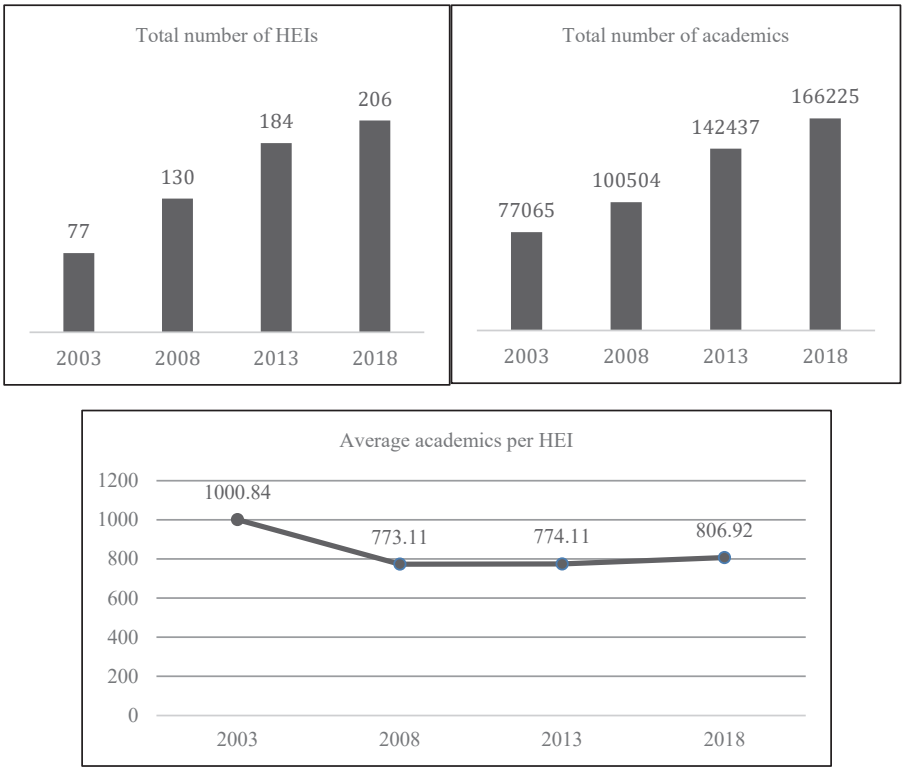
The massification has brought greater teaching loads for many faculty members who also have faced infrastructural problems since a considerable number of the newly established institutions have had to suffer from the lack of human and financial capital (Özoglu, Gür, & Gümüs, 2016). In the meantime, there has been changes also in research expectations from academics. For example, the Interuniversity Council (ÜAK) renewed the national tenure scheme in 2015 adding different criteria to the publication record (ÜAK, 2018). According to the new criteria-set, academics are now expected to publish greater amount of research articles as well as pursue more external funding gained from research projects. Starting with 2015, in addition, annual research activities of academics are rewarded financially if the published articles or joint research projects exceed a certain number (Yokuş, Ayçiçek, & Kanadlı, 2018). Moreover, the government expect institutions to follow an entrepreneurial university mindset in their management and teaching-research activities creating and advertising an entrepreneurial university index. Since 2012, this national index of most entrepreneurial and innovative universities in Turkey has been prepared by The Scientific and Technological Research Council of Turkey, (TÜBİTAK), the leading governmental unit for national science and research policy (Er & Yıldız, 2018). Applied research and appointees are also incentivized more in areas such as energy, water, food, industry of defense and manufacturing by the government (TÜBİTAK, 2018). All these changes and expectations have forced academics employed in Turkish HEIs to deal with the consequences of rapid expansion and teaching loads, while they are also facing with the increasing

research related expectations, and resulted in the need of studies examining the perception of academics in terms of their teaching and research activities.



Source: Center for Assessment, Evaluation and Placement (ÖSYM), 2009; YÖK, 2004, 2019

Figure 1. Numbers of new enrollments and total students in Turkish higher education (2003-2018)



Source: Çetinsaya, 2014; Günay & Günay, 2011; ÖSYM, 2009; YÖK, 2004, 2019

Figure 2. Numbers of HEIs, academics and average number of academics per HEIs in Turkey (2003-2018)

Methodology

This work is part of a larger international and comparative study, APIKS, which is the third wave after CAP 2007 and Carnegie 1992 projects. For the first time, Turkey joined the project in the third wave, APIKS. Considering the nature of research questions, we employed a descriptive survey design for the current study. Survey design is useful in a variety of instances including when the researcher aims at scanning the general characteristics and patterns of a subject in a large-scaled environment (Ary, Jacobs, Razavieh, & Sorensen, 2006). The population of our study consisted of 158,098 academics working in Turkish higher education institutions in the 2017-2018 academic year (YÖK, 2017). Collecting email addresses of potential participants from an open-access national researcher database (ARBIS-Researcher Information System of TÜBİTAK), invitations including a web link to the Turkish translation of APIKS questionnaire were sent (roughly) to 50,000 academics' email addresses. After the elimination of insufficient responses, our final sample consisted of 1,822 academics, which is adequate to represent the academic population in Turkey with a 99% confidence level and ± 3 confidence interval (Cohen, Manion, & Morrison, 2007). Table 1 shows the distribution of participant demographics.

Table 1. Distribution of participants by disciplines, titles, gender, and institutional type and establishment dates

Variable	Distribution of participants											
Gender	Male		Female									
	f	%	f	%								
	911	50.0	910	49.9								
Discipline*	STEM		Medical sciences		non-STEMM							
	f	%	f	%	f	%						
	636	34.9	406	22.3	780	42.8						
Title	Prof.		Assoc. Prof.		Assist. Prof.		Res. Assist.		Lecturer		Other	
	f	%	f	%	f	%	f	%	f	%	f	%
	404	22.2	403	22.1	512	28.1	322	17.7	169	9.3	12	0.7
University type**	Public		Foundation		Other(s)							
	f	%	f	%	f	%						
	1,540	84.5	270	14.8	12	0.7						
Establishment date of universities***	pre-1992		1992-2005		Post-2005							
	f	%	f	%	f	%						
	903	49.6	517	28.4	394	21.6						

As shown in Table 1, based on the initial categorization given in the APIKS questionnaire, we classified academic disciplines as STEM, medical sciences, and non-STEMM areas. STEM fields include life sciences, physical sciences and mathematics, chemistry, computer sciences, engineering, manufacturing and construction-architecture, and agriculture and forestry. On the other hand, non-

STEMM fields include teacher training and education science, humanities and arts, social and behavioral sciences, business, administration and economics, law, social work and services, and personal services, transport services, and security services. In terms of the classification of institution type, it is contextually important to note that the constitutions in Turkey do not allow to establish a private university; only non-profit foundations can establish a university other than the State in Turkey. Therefore, there are public and non-profit foundation universities. We also classified institutions according to their establishment date, considering the first and second serious expansion in the Turkish Higher Education system (Özoglu et al., 2016; Uslu, 2015).

Data were collected online through an e-survey system during the 2017-2018 academic year (October 2017-May 2018). Considering the purpose of the current research, we identified several questions covering respondents' academic and institutional background, perceptions on T-R nexus, and orientations and general characteristics of research and teaching activities in the APIKS questionnaire. We then included these questions into our data analysis process. For the assessment of normality assumption, we employed Kolmogorov-Smirnov (K-S) test, and K-S test for each independent variable (gender, title, discipline, institution type, and establishment date) produced a significant difference ($p \leq .05$) as a sign of non-normal distribution. Descriptive (e.g. frequency, percentage, mean and standard deviation) and inferential analyses (Mann Whitney-U, Kruskal Wallis) were run to examine the perceptions regarding T-R nexus and characteristics of academics' teaching and research activities according to individual background and institutional features.

Findings

Considering the order of research questions, we report our findings in two main sections: (1) T-R nexus perceptions of academics in Turkey and (2) characteristic of academics' research and teaching activities in Turkish universities.

T-R nexus

We investigated the T-R nexus in Turkish higher education based on the results of three related questions in the APIKS questionnaire. Table 2 demonstrates the results of the first related question that examines the level of compatibility between teaching and research.

As shown in Table 2, the level of perceived compatibility between the respondents' teaching and research activities was at the half level. Inferential analysis further demonstrated that there were significant differences in the perceived compatibility between teaching and research activities according to gender and academic title. In terms of gender, the compatibility between teaching and research was higher among female faculty members. According to title, furthermore, the compatibility was at the greatest level among professors. These findings illustrated that the perceptions toward the

compatibility of teaching and research activities differs by gender and academic title, implying that female faculty members and experienced title holders such as professors and associate professor appear have more positive perceptions about the teaching and research compatibility. The second related question further examines the level of research-reinforced teaching, and the results of this question are demonstrated below in Table 3.

Table 2. Differences in the level of compatibility between teaching and research, by gender, title, and discipline¥

Gender	n	$\bar{X}$	s.d.	Mann-Whitney U			
				$\bar{X}_{Rank}$	$\sum_{Rank}$	Z	p
1. Male	911	3.32	1.26	883.44	804,811.50	-2.30	.02*
2. Female	910	3.45	1.26	938.59	854,119.50		
Title	**n**	$\bar{X}$	**s.d.**	**Kruskal-Wallis**			
				$\bar{X}_{Rank}$	χ^2	d.f.	p
1. Prof.	404	3.62	1.22	1,008.80			
2. Assoc. Prof.	403	3.45	1.17	929.46			
3. Assist. Prof.	512	3.29	1.25	868.52	24.35	5	.00*
4. Res. Assist.	322	3.22	1.28	845.35			
5. Lecturer	169	3.30	1.43	890.19			
6. Other	12	3.42	1.44	941.75			
Discipline	**n**	$\bar{X}$	**s.d.**	**Kruskal-Wallis**			
				$\bar{X}_{Rank}$	χ^2	d.f.	p
1. STEM	636	3.35	1.22	895.04			
2. Medical sciences	406	3.31	1.29	881.97	4.46	2	.11
3. non-STEMM	780	3.45	1.27	940.29			

Note: The survey question here was "Teaching and research are hardly compatible with each other". Considering the negativity in the question, the scores were firstly reversed, and recoded as: 1→5; 2→4; 4→2; 5→1

¥ $\bar{X}_{all}$=3.39; s.d=1.26 (1.00-1.79: Strongly disagree, 1.80-2.59: Disagree, 2.60-3.39: Half, 3.40-4.19=Agree, 4.20-5.00=Strongly agree)

* $p \leq .05$

Table 3. Differences in the level of research-reinforced teaching, by gender, title, and discipline¥

Gender	n	$\bar{X}$	s.d.	Mann-Whitney U			
				$\bar{X}_{Rank}$	$\sum_{Rank}$	Z	p
1. Male	801	3.57	1.19	795.22	636975.00	-.39	.70
2. Female	797	3.59	1.18	803.80	640626.00		
Title	**n**	$\bar{X}$	**s.d.**	**Kruskal-Wallis**			
				$\bar{X}_{Rank}$	χ^2	d.f.	p
1. Prof.	393	3.79	1.13	878.14			
2. Assoc. Prof.	391	3.66	1.12	821.12			
3. Assist. Prof.	493	3.47	1.20	756.09	22.89	5	.00*
4. Res. Assist.	183	3.40	1.21	733.07			
5. Lecturer	136	3.43	1.36	765.25			
6. Other	3	3.33	1.15	685.33			
Discipline	**n**	$\bar{X}$	**s.d.**	**Kruskal-Wallis**			
				$\bar{X}_{Rank}$	χ^2	d.f.	p
1. STEM	555	3.55	1.16	781.22			
2. Medical sciences	367	3.32	1.29	710.44	29.73	2	.00*
3. non-STEMM	677	3.76	1.12	863.95			

Note: The survey question (focusing only on teaching-active respondents) here was "Your research activities reinforce your teaching".

¥ $\bar{X}_{all}$=3.58; s.d=1.19 (1.00-1.79: Strongly disagree, 1.80-2.59: Disagree, 2.60-3.39: Half, 3.40-4.19: Agree, 4.20-5.00: Strongly agree)

* $p \leq .05$

According to Table 3, the respondents *agreed* that their research activities reinforced their teaching. Further analyses indicated significant differences in the level of research-reinforced teaching

according to academic title and discipline. Based on title, professors were the ones who had the highest level of perceptions toward research-reinforced teaching. In terms of disciplinary differences, research-reinforced teaching was at the highest level among non-STEMM disciplines, while medical and health science faculty were the ones perceiving the least research-reinforce in their teaching activities. These findings showed that the level of research-reinforced teaching activities among Turkish academics differ in terms of title and discipline, indicating more positive perceptions toward benefitting from research-reinforced teaching activities among experienced titles such as professors and associate professors, and among academics studying non-STEMM disciplines. As the last survey question in this section, distribution of respondents' primarily interest in teaching and/or research were illustrated below in Table 4.

Table 4. Distribution of primarily interest in teaching and/or research, by gender, title, and discipline

Variable	Group	Primarily interest							
		Teaching		Both, leaning teaching		Both, leaning research		Research	
		f	%	F	%	f	%	f	%
Gender	Male	31	3.4	250	27.4	516	56.6	114	12.5
	Female	13	1.4	233	25.6	545	59.9	119	13.1
Title	Prof.	9	2.2	124	30.7	249	61.6	22	5.4
	Assoc. Prof.	6	1.5	103	25.6	246	61.0	48	11.9
	Assist. Prof.	12	2.3	154	30.1	285	55.7	61	11.9
	Res. Assist.	3	.9	52	16.1	195	60.6	72	22.4
	Lecturer	14	8.3	50	29.6	81	47.9	24	14.2
	Others	-	-	-	-	6	50.0	6	50.0
Discipline	STEM	9	1.4	119	18.7	403	63.4	105	16.5
	Medical sciences	9	2.2	128	31.5	235	57.9	34	8.4
	non-STEMM	26	3.3	236	30.3	424	54.4	94	12.1
All		44	2.4	483	26.5	1,062	58.3	233	12.8

Table 4 shows that, the majority of the respondents' primarily interest appeared in *"both, but leaning research"*. In addition, more than two thirds of the participants were primarily interested in "both, but leaning research" or "research". In terms of individual background, frequency analysis demonstrated that leaning research or pure research interest have highly close ratios among female and male academics. Again, comparing the teaching and/or research interest of academics, the percentages are similar for each title group. Furthermore, academics in STEM disciplines expressed greater interest in "research" or "both, leaning research", while interest in "teaching" or "both, leaning teaching" was more common among academics in non-STEMM disciplines.

Results of the three aforementioned questions demonstrated that Turkish academics had positive perceptions regarding research teaching nexus in their work, perceiving there is a high level of compatibility and reinforcement between their research and teaching activities. One can notice that experienced academics have higher participation levels in terms of both research-teaching compatibility and research-reinforced teaching. This illustrates that positive perceptions toward T-R nexus are more common among higher ranks than junior academics in Turkey. For the first two analyses, interestingly, faculty in non-STEMM disciplines tended to score more positively compared

to other disciplines, which implies that nexus between teaching and research activities can be more common in non-STEMM disciplines. On the other hand, while there are positive perceptions toward T-R nexus, it appears that the majority of Turkish academics' primarily interest lies in research.

Characteristics of teaching and research activities

We examined the characteristics of Turkish academics' teaching and research activities based on several related questions of the APIKS questionnaire. The first question here focused on the distribution of teaching activities. Table 5 demonstrates the frequencies of teaching activities carried out by participants.

Table 5. Distribution of teaching activities

Teaching activity	F	%	Teaching activity	f	%
Classroom instruction/lecturing	1,521	83.5	Distance education	270	14.8
Individualized instruction	318	17.5	Development of course material	729	40.0
Project-based learning	619	34.0	Curriculum/program development	391	21.5
Practice instruction/ laboratory work	916	50.3	Face-to-face interaction with students outside of class	1,125	61.7
ICT-based learning/computer-assisted learning	272	14.9			

Note: The survey question here was "During the current (or previous) academic year, have you been involved in any of the following teaching activities".

Table 5 shows that the most common teaching activity among Turkish academics was classroom instruction/lecturing, followed by face-to-face interaction with students outside of the class. In addition, distance education and ICT-based/computer assisted learning were found as the least common teaching activities among participants. These findings imply that traditional methods of lecturing are still prevalent among Turkish academics; however, usage of technology-assisted learning applications appears rare. Table 6 below illustrates the level of research orientations to examine the emphasized characteristics of participants' research activities.

Table 6. Level of research orientations

Research orientation	$\bar{X}$*	s.d.	Research orientation	$\bar{X}$**	s.d.
Basic/theoretical	2.98	1.27	International in scope or orientation	2.98	1.31
Applied/practically-oriented	4.02	1.11	Based in one discipline	2.25	1.20
Commercially-oriented/intended for technology transfer	2.03	1.20	Multidisciplinary	3.79	1.17
Socially-oriented/intended for the betterment of society	2.85	1.43			

Note: The survey question here was "How would you characterize the emphasis of your primary research this (or the previous) academic year?"

* 1.00-1.79: Not at all, 1.80-2.59: Slightly, 2.60-3.39: Half, 3.40-4.19: Much, 4.20-5.00: Very much

As shown in Table 6, the greatest orientation was towards applied/practical research, followed by multidisciplinary research. On the other hand, research aiming commercial purposes (or technology transfer) and based in one discipline were found to have the lowest levels of orientation. According to these findings, carrying out applied or practically oriented research and multidisciplinary studies are the most common research trends in Turkish academia. In order to understand the varying characteristics of research and teaching activities further analyses were run on individual background and institutional features. Table 7 demonstrates the institutional differences in teaching and research orientation and seeking teaching and research quality in appointees.

Table 7. Institutional differences in the level of universities' teaching and research orientation and the level of seeking teaching and research quality in academic appointment/ promotion decisions

Activity	Institution type	n	$\bar{X}$**	s.d.	Mann-Whitney U			
					$\bar{X}_{Rank}$	$\sum_{Rank}$	Z	p
…a strong teaching performance orientation	1. Public	1,540	2.63	1.19	868.08	1,336,843.00	-7.47	.00*
	2. Foundation	270	3.24	1.19	1,118.93	302,112.00		
…a strong research performance orientation	1. Public	1,540	2.68	1.21	880,03	1,355,251.00	-5.08	.00*
	2. Foundation	270	3.11	1.26	1,050.76	283,704.00		
…considering the teaching quality	1. Public	1,540	2.73	1.30	866.60	1,334,558.50	-7.74	.00*
	2. Foundation	270	3.41	1.26	1,127.39	304,396.50		
…considering the research quality	1. Public	1,540	2.22	1.13	860.96	1,325,882.50	-8.96	.00*
	2. Foundation	270	2.95	1.22	1,159.53	313,072.50		
Activity	**Establishment Date**	**n**	$\bar{X}$**	**s.d.**	**Kruskal-Wallis**			
					$\bar{X}_{Rank}$	χ^2	d.f.	p
…a strong teaching performance orientation	1. pre-1992	903	2.73	1.20	910.32			
	2. 1992-2005	517	2.74	1.23	913.85	.44	2	.80
	3. post-2005	394	2.69	1.21	892.70			
…a strong research performance orientation	1. pre-1992	903	2.83	1.23	943.52			
	2. 1992-2005	517	2.68	1.23	878.83	9.19	2	.01*
	3. post-2005	394	2.64	1.22	862.57			
…considering the teaching quality	1. pre-1992	903	2.83	1.32	907.79			
	2. 1992-2005	517	2.84	1.32	907.64	.00	2	1.00
	3. post-2005	394	2.84	1.31	906.66			
…considering the research quality	1. pre-1992	903	2.83	1.31	892.56			
	2. 1992-2005	517	2.29	1.13	923.32	1.57	2	.46
	3. post-2005	394	2.36	1.17	920.99			

Note: The research questions here were "(1) At your institution, there is…" and "(2) When making personnel (faculty hiring/promotion) decisions…"

* $p \leq .05$; **1.00-1.79: Strongly disagree, 1.80-2.59: Disagree, 2.60-3.39: Half, 3.40-4.19: Agree, 4.20-5.00: Strongly agree

As shown in Table 7, based on institution type, there were significant differences both in institutions' teaching and research orientations and in considering teaching and research quality when making personnel decisions. For the all four activities, foundation universities were found to be more active than public institutions. These findings illustrate that in comparison with public institutions, foundation universities have a strong teaching and research performance orientation, and they more consider quality of teaching and research when making personnel decisions. Findings in the Table 7

further demonstrated that having a strong research performance orientation differed by university's date of establishment. It appears that older institutions have the strongest research performance orientation, while the youngest universities tend to have lower levels. Table 8 below demonstrates the institutional differences in weekly in-session teaching and research hours.

Table 8. Institutional differences in weekly in session teaching and research time spent by academics

Activity¥	Institution type	N	$\bar{X}$	s.d.	Mann-Whitney U			
					$\bar{X}_{Rank}$	$\sum_{Rank}$	Z	p
In-session teaching hours per week	1. Public	1,540	17.27	12.53	915.86	1,410,421.50	-2.02	.04*
	2. Foundation	270	15.35	11.13	846.42	228,533.50		
In-session research hours per week	1. Public	1,540	12.17	10.82	916.06	1,410,732.50	-2.06	.04*
	2. Foundation	270	10.57	9.33	845.27	228,222.50		
Activity¥	**Establishment Date**	**N**	$\bar{X}$	**s.d.**	**Kruskal-Wallis**			
					$\bar{X}_{Rank}$	χ^2	d.f.	p
In-session teaching hours per week	1. pre-1992	903	16.13	11,92	877.39			
	2. 1992-2005	517	17.59	12,37	938.06	5.98	2	.50
	3. post-2005	394	17.81	13,27	936.41			
In-session research hours per week	1. pre-1992	903	12.10	11,92	926.52			
	2. 1992-2005	517	11.48	12,37	874.12	3.33	2	.19
	3. post-2005	394	11.99	13,27	907.71			

Note: The survey question here was "Considering all your professional work, how many hours do you spend in a typical week on each of the following activities?" (Off-session work hours are excluded from the analysis since the focus is on in-session workload.)

¥ The weekly average in session worktime is 39.07 (s.d.=20.24); the mean of teaching time is 43.28% of weekly average workhours in session while the mean of research time is 30.46%.

* $p \leq .05$

Table 8 shows that, time devoted to both teaching and research significantly differed in terms of institution type. Inferential analysis indicated that academics in public universities spent more time for both teaching and research than the academics employed in foundation universities. Moreover, although there was no significance, differences in teaching hours according to universities' date of establishment is also worth to consider. Based on these results, it can be noticed that academics working in older institutions may have less teaching loads than the academics in younger institutions. Lastly, Table 9 shows the significant differences in average in-session teaching and research time according to individual background.

Table 9 shows that there was no significant gender difference in average in-session time for teaching; however, gender differences were found in average in-session time for research. According to these results, female academics devoted more in-session time for research. Moreover, significant differences were found in both in-session teaching and in-session research hours based on academic title. It appears devoted in-session time for teaching was highest among assistant professors, while the time for research was highest among research assistants. Furthermore, disciplinary differences were reported in both in-session teaching and in-session research hours. According to the findings, both minimum in-session teaching and research hours were devoted by academics in Medical sciences.

Table 9. Differences in weekly in session teaching and research time, by gender, title, and discipline

Activity	Gender	n	$\bar{X}$	s.d.	Mann-Whitney U			
					$\bar{X}_{Rank}$	$\sum_{Rank}$	Z	p
Teaching	1. Male	911	16.84	12.39	907.73	826,946	-.27	.79
	2. Female	910	16.99	12.38	914.27	831,985		
Research	1. Male	911	13.86	14.88	881.87	803,384	-2.41	.02*
	2. Female	910	15.54	15.62	940.16	855,547		
Activity	**Title**	**n**	$\bar{X}$	**s.d.**	**Kruskal-Wallis**			
					$\bar{X}_{Rank}$	χ^2	d.f.	p
Teaching	1. Prof.	404	16.10	10.71	891.87	302.74	5	.00*
	2. Assoc. Prof.	403	19.73	11.75	1,040.54			
	3. Assist. Prof.	512	21.48	12.37	1,105.01			
	4. Res. Assist.	322	7.89	9.00	505.67			
	5. Lecturer	169	16.40	13.38	878.40			
	6. Other	12	4.75	10.26	338.46			
Research	1. Prof.	404	11.06	8.40	904.28	32.84	5	.00*
	2. Assoc. Prof.	403	12.34	10.26	944.82			
	3. Assist. Prof.	512	11.88	9.67	926.78			
	4. Res. Assist.	322	13.94	13.59	964.78			
	5. Lecturer	169	9.47	11.78	729.53			
	6. Other	12	6.17	10.33	516.67			
Activity	**Discipline**	**n**	$\bar{X}$	**s.d.**	**Kruskal-Wallis**			
					$\bar{X}_{Rank}$	χ^2	d.f.	p
Teaching	1. STEM	636	17.22	11.77	932.83	18.93	2	.00*
	2. Medical sciences	406	14.53	6.26	812.27			
	3. non-STEMM	780	17.91	13.22	945.76			
Research	1. STEM	636	13.36	11.13	988.85	25.37	2	.00*
	2. Medical sciences	406	10.32	9.52	828.12			
	3. non-STEMM	780	11.54	10.60	891.83			

Note: The survey question here was: "Considering all your professional work, how many hours do you spend in a typical week on each of the following activities?" (Off-session work hours are excluded from the analysis since the focus is on in-session workload.)

* $p \leq .05$

Discussion

With the Humboldtian idea of the university, the interplay between teaching and research became more prevalent in higher education. Through this idea, university models evolved into a model that more emphasizes the compatibility between teaching and research and employing research results into teaching. A more balanced weight of teaching and research role was therefore introduced in higher education in many parts of the world (Nybom, 2003). Recent trends, however, have expanded the role of research. Factors such as cuts in public funding and a more marketized and globally competitive environment have led HEIs to pursue entrepreneurial motivations and generate revenue from research activities (Marginson, 2006; Slaughter & Rhoades, 2004). On the other hand, globalization and massification have brought a more diverse student body into higher education that have a variety of expectations from academics. In many cases, using technology in the class, online lecturing skills, applied laboratory work or innovative teaching activities have become prerequisites for the teaching role of academics (Fry et al., 2003). Therefore, academics have faced the necessity of seeking external funding from applied and (often) commercialized research while simultaneously feeling the pressure of innovative teaching responsibilities.

The current study demonstrated that Turkish academics are also subject to the changing and pressuring trends aforementioned above. Our findings showed that perceptions related to indicators of

T-R nexus, the compatibility between teaching and research, and research-reinforced teaching, were positive, appearing at a moderate to high level. This indicates that Turkish academics perceive the critical importance of the interplay between teaching and research in their work (Zimbardi & Myatt, 2014; Zubrick et al., 2001). This finding is also in line with CAP 2007 results where most of the participants expressed an interest in a nexus between teaching and research (Teichler et al., 2013). Furthermore, full professors and female faculty members appear as having more interest in T-R nexus among Turkish academics. This can be related to the accumulated experience of high ranked professors both in research and teaching and to larger opportunities they might have in the creation of linkages between teaching and research through their graduate courses and supervisory roles for higher degree research students. The significant difference in gender disparity in favor of female academics in terms of combining research into the teaching appears as a further research theme reasons of which might require a detailed examination with relation to the role and status of women in male dominated societies such as the case of Turkey. Emphasizing greater interest of non-STEM disciplines in T-R nexus, our findings seem consistent with Griffiths' (2004) study revealing that T-R nexus is often discipline dependent.

However, the orientation of Turkish academics seemed primarily towards research in terms of Arimoto's (2015) classification. Institutions, particularly older public institutions and foundation ones were also seen more research oriented compared to teaching, and they more consider quality of research than teaching in making personnel decisions. These findings are consistent with Carnegie 1992 and CAP 2007 results internationally (Teichler et al., 2013), and the recently introduced tenure policies and publication incentives nationally. According to tenure regulations in Turkey (ÜAK, 2018), 86% of tenure criteria-set requires research activities (e.g., publishing articles, presenting at conferences, carrying out nationally or internationally funded project-based research), while teaching based activities cover only 14% (supervising graduate students with 10% and lecturing with 4%). Similarly, academics' research activities at a certain quantitative level are incentivized financially by government in Turkey (Yokuş et al., 2018). Thus, orientation leaning research can be an expected result.

Our study also illustrates that Turkish academics might suffer from pressure and the dilemma brought by massification. Consistent with Horgan's (2003) study arguing that lecturing is the main teaching technique in a crowded class environment, findings in the current research highlighted that teaching activities in Turkish universities are mostly performed in a face-to-face and classroom-based manner. Diverse student body and their needs require newer methods in teaching and lecturing. However, rapid expansion and massification in Turkish higher education and the domination of undergraduate (and also associate degree) level teaching activities in Turkish universities brings high teaching loads at the undergraduate level, which are mostly operated book/theory based in the class due to the infrastructural problems (Özoglu et al., 2016). Because of this, practical use of research activities in teaching process can be considered lower than expected.

In terms of research, our study indicated that Turkish academics are expected to pursue significant amounts of external funding and feel the necessity of complying funders' guidelines. Moreover, they lean more to applied/practical and multidisciplinary research. These findings can also be associated with global trends (Cummings & Teichler, 2015; Teichler & Höhle, 2013), and national as well as institutional expectations reinforcing pursuing external funding and carrying out practical research (Er & Yıldız, 2018; Slaughter & Rhoades, 2004, TÜBİTAK, 2018). However, the findings demonstrate that weekly work hours are more dedicated to teaching than research. Also, lower ranks (especially assistant professors) have more teaching loads, and there are also differences in terms of average research time by gender and disciplines. In all, the absence of teaching development units and education-focused research supports in most of Turkish universities can be considered as important institutional deficiencies to minimize such differences between teaching efforts of academics and also enhance to their teaching methods (Uslu, 2016).

Conclusion

This study demonstrates that Turkish academics have positive perceptions regarding the nexus between teaching and research. However, rapid expansion and changing research trends may influence the academic profession in Turkey and bring contradictions in T-R nexus by leaning the orientations more toward research while employing more traditional methods in teaching at the same time. Within this perplexing context, policy makers and institutional leaders should seek ways for expansion without neglecting quality and balancing their expectations from academics in terms teaching and research taking the realities in the rapidly expanding higher education into account. Going beyond national context, it appears that global trends in higher education tend to continue forcing academics to lean more on research. Therefore, governments, industrial stakeholders and other research funding institutions can provide more innovative opportunities for academics that enable infusing research process and results into teaching in order for higher education to meet the learner expectations in the 21st century. Such opportunities may include teaching centers facilitating joint work/cooperation between teaching and research faculty and provide support on enhancing research integrated teaching skills. Moreover, research oriented institutional structures (i.e. research offices, technology transfer offices, incubators) and research commercialization process may play a cooperative role among academics in expanding the use of research in teaching. Lastly, researchers may pursue further research on essential phases of developing research-informed teaching process and to strengthen the T-R nexus in terms of different national, institutional and disciplinary contexts and academic ranks.

This work represents an example of a higher education system which faces a rapid expansion and massification and the opportunities and challenges that come with this growth in relation to research, teaching and T-R nexus. To benefit from the opportunities and overcome the challenges when faced with the expansion of higher education systems where T-R nexus is fully and successfully achieved,

some points to consider can be suggested for policy makers and administrators: (1) Effective resource management and investment planning are important in achieving T-R nexus; (2) investment in human resources needs to be prioritized to increase the number of academics in a growing higher education system; (3) teaching and research loads should be organized in such a way that time devoted to research is sufficiently allocated; (4) physical and technological infrastructure that would allow the integration of research output into teaching and learning needs to be in place; (5) teaching enhancement unit(s) and educational innovation fund(s) should be established to support the continuity of educational development.

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