

# **Inclusively Recognizing Faculty Innovation and Entrepreneurship Impact Within Promotion and Tenure Considerations**

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## Declarations

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## **Abstract**

Faculty research has led to a plethora of innovations and entrepreneurial resources (I&E), allowing for enhancements to the greater social good including, but not limited to, technological and economic advancements. Faculty I&E also enhances faculty competitiveness for funding, institutional image and fundraising, and supports students' workforce preparation. Over time institutions of higher education have recognized the value of faculty I&E in their mission statements and strategic plans. Yet commensurate promotion and tenure processes and policies are not a given, within and across institutions, and many faculties may be in the position of weighing their own interests in I&E activity against a lack of its explicit value in academia. Admittedly, though, an empirical basis regarding these suspicions is limited. Herein, we describe our work: 1) mapping the otherwise unknown terrain of factors relevant to the evaluation of tenure-line faculty members' I&E in promotion considerations in the US, via a survey of 99 unique institutions across the academic spectrum and, from this, 2) advancing recommendations to inform a non-binding alliance of over 67 US institutions that share a common commitment to pursuing best practices for inclusively recognizing faculty I&E impact through university reward structures.

**Keywords:** Faculty Innovation, Entrepreneurship, Promotion, Tenure, Higher Education

## **Introduction and Literature Review**

### **The Value of Faculty Innovation and Entrepreneurialism**

As university-based researchers race to contribute knowledge for the worldwide response to COVID-19, we are reminded how faculty research (including that starting as basic science) has led to a plethora of innovations, methods, services, or technologies with potential to enhance the social good. The collective innovation and entrepreneurship (I&E) of faculty members at institutions of higher education, within the United States alone, has vast potential for positive societal impacts worldwide. Including work resulting in copyrights and patents, impactful faculty I&E goes well beyond technology. In fact, many faculty-generated innovations have little to no immediate market potential - for instance, the development of culturally appropriate technologies for cleaner cooking or filtering water with community stakeholders (Calás et al., 2009). Still, recognizing the benefits of such work, some faculty and academic administrators have become key actors in the neoliberal state, contributing their research products or discoveries to the market (Mendoza et al., 2020; Slaughter et al., 2005).

Over time, institutions of higher education seem to have recognized the value of various types and impacts of faculty I&E, as reflected in reshaped mission statements and strategic plans (Genshaft et al., 2016; McClure, 2016). A corresponding commitment to academic capitalism (Slaughter et al., 2005) can position new research findings as knowledge of value to the larger society, including the private sector for commercialization (Rooksby and Pusser, 2014). Besides enhancing the public good and economies, faculty I&E enhances the image, and fundraising capacities of institutions of higher education, the recruitment of faculty, and the retention of

diverse personnel (Genshaft et al., 2016; McDevitt et al., 2014; Mendoza et al., 2020; Stevens et al., 2011). And faculty members, themselves, benefit professionally from their I&E work. Resulting publications and presentations enhance faculty competitiveness for external funding of their subsequent activities, as do patents and commercialization activities. Faculty engagement with funders and industry is correlated with gains in research productivity, work citations, and prestige (Genshaft et al., 2016; Gonzales and Núñez, 2014; McDevitt et al., 2014; Stevens et al., 2011). An argument might even be made for promoting a more encompassing notion of I&E as beneficial to faculty, in its interplay with issues of equity and inclusion, issues ever-more prevalent in institutions of higher education mission statements (Pierszalowski et al., 2019).

Faculty I&E work also supports students' career preparation and aspirations. Beyond providing financial support for student researchers, faculty engaged in I&E activities can develop and offer educational programming through which students can develop collaboration, communication, and marketing skills (Demirkan and Spohrer, 2015), and design thinking (Kuratko, 2005). The interdisciplinary and "soft" skills (e.g. communication skills, creativity) promoted by I&E work help students learn to contribute to solving local and global challenges (Demirkan and Spohrer, 2015; Hora et al., 2020; Lenhart et al., 2020; National Research Council, 2015). Graduates exposed to I&E activities during postsecondary education may better compete for workforce positions, including private-sector jobs which even those having earned doctorates are currently more likely to secure, over jobs in public-service domains, including academia (Lautz et al., 2018). Indeed, over the last two decades, certain STEM fields (life, health, computer, and mathematical sciences) have seen a 10-16% decrease in tenure-line positions in academia, with ever more students entering other sectors with I&E as their

cornerstone (NSF, 2017). Students trained in I&E work may better direct their careers and demonstrate career resiliency (Genshaft et al., 2016; McDevitt et al., 2014; Sanberg et al., 2014).

### **The (De)valuing Faculty Innovation and Entrepreneurialism in Promotion and Tenure Considerations?**

Yet despite the positive impacts of faculty I&E, and the various social and industrial structures promoting academic capitalism towards economic growth and competitiveness (Mendoza and Berger, 2008), there is reason to believe that such work is still devalued in academia. The norms of academia, what Etzkowitz and Leydesdorff (1995) call rules and regulations, including teaching and training, may influence this. For instance, “purer” forms and goals of inquiry may continue to be privileged, such as basic science done “for the greater good” (Anderson et al., 2010; Mendoza et al., 2020). Specifically, promotion and tenure (P&T) processes and policies that recognize and reward faculty members’ I&E work are not a given (Bouwma-Gearhart et al., 2021; Genshaft et al., 2016; Lach and Schankerman, 2008; Siegel et al., 2003), even at research universities where partnerships with industry and community partners may be more assumed (Renault, 2006; Sanberg et al., 2014). Traditional (and somewhat ambiguous) metrics of the impact of faculty research (e.g. publications, federal grant dollars), afforded prestige by a community of experts, may not have evolved to sufficiently evaluate or acknowledge faculty I&E-focused advances (Renault, 2006; Stevens et al., 2011). And a large enough community of academics may not yet exist to confer legitimacy of faculty I&E work across the disciplines, nor at their intersection (where some I&E work is done).

So, at least at the turn of the century, it seemed that faculty doing innovation-focused and entrepreneurial-minded research could risk venturing down P&T paths based on somewhat antiquated value systems. But just how concerning is this problem currently? Admittedly,

research confirming suspicions that the devaluing of faculty I&E in P&T review is limited. In 2014, Sanberg et al. (2014) demonstrated that most universities within the US (and around the globe) had not evolved P&T guidelines to consider faculty patents and other indicators of innovation as commercialization. Similarly, a 2015 APLU task force concluded that some US institutions of higher education did not reward faculty technology transfer in P&T considerations (Genshaft et al., 2016). Per these limited findings, it seems US institutions of higher education may inadequately promote faculty I&E to a degree that can keep up with societal demands. (Similar findings have been noted internationally; see Macuare and Kubisen, 2017).

Still, this past research has largely concerned one type of faculty I&E activity, that being the legal “transfer” of developed technology to another entity (e.g. a business or (non)governmental organization). We know less about how other types of faculty I&E are considered in P&T, including faculty members’ work with under-served communities, that may initially result in a reduced volume of products often assessed as P&T metrics (Genshaft et al., 2016). Even when upper administration champions it, institutional reviewers may view such work as less worthy faculty output (O’Meara et al., 2015). And there may be disagreement regarding what faculty I&E should “count as”---teaching, research, service, broader impact, or some other faculty work category (Genshaft et al., 2016; O’Meara et al., 2015; Sanberg et al., 2014; Stevens et al., 2011). This research, coupled with complaints of faculty attempting I&E, have led to some national efforts to better support faculty I&E. These include the National Science Foundation (NSF) I-Corps<sup>1</sup> program, funding a consortium of institutions to attempt to prepare current and future faculty to engage in activities focused on the broader impacts of

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<sup>1</sup> I-Corps, National Science Foundation Innovation Corps, is made up of a group of universities designed as either an I-Corps Site or Node which delivers innovation and entrepreneurial training to researchers to help them learn the process of commercializing research.

research. This includes providing faculty local and national entrepreneurial training programs. Yet these programs notably target projects and institutions already funded by NSF.

And, still, there are hints that even universities with an established innovation-driven culture may struggle in aligning P&T processes and policies, including across the institution, college/disciplinary, and department levels, to account for faculty technology transfer (Genshaft et al., 2016). Key differences between university-level and college- and department-level missions, policies, traditions, and practices may create mixed messages to faculty. Units that have not historically embraced such efforts may further discourage faculty I&E. Dossier reviewers within and between institutions may, together, form a perfect storm of a lack of knowledge and commitment to effectively evaluate faculty I&E.

How might we create nimbler and more flexible P&T systems to effectively evaluate faculty I&E work, accounting for their modern realities, as well as attending to the needs of the institutions and society to which they contribute? Of course, the potential of any attempts to transform complex systems turns on firm understandings of those systems, and this holds for inter- and intra-organizational systems involving faculty work and change efforts (Bouwma-Gearhart et al., 2021; 2012; Bouwma-Gearhart, 2012a). While the literature we have noted above is helpful, the research base concerning our problem of interest is still relatively scant. Notably, the current evaluation of faculty I&E, broadly conceived, in considerations of P&T across the diverse higher education landscape is unknown. Towards a vision for better supporting and rewarding faculty innovation and entrepreneurialism, we recognized first the need to start to map the current terrain.

### **Conceptual Frameworks: Cultural Norms and Institutional Isomorphism**

The state of I&E in considerations of faculty P&T, like many phenomena impacting faculty realities, is at the intersection of multiple phenomena within and between organizations in academia (Bouwma-Gearhart et al., 2016). These phenomena include cultural norms and how they influence, and are influenced by, organizational structures and processes. Mendoza et al. (2020) conceptualize academia as a cultural field, where “norms determine legitimacy” (p. 1475), that of an academics’ work and, by proxy, the academics themselves. The professional work of academics (those that work in the institutions of academia towards discovering or making other advancements in knowledge) is highly specialized, requiring other peer specialists to judge its worth, typically afforded by work being distributed via prestigious outlets (e.g. journals or conferences) or other rewards concerning the merit of professionals’ ideas (e.g. external funding of future research projects); these outlets, themselves, are the product of peer review.

Alongside these legitimization-by-peer norms are others guiding the evaluation of academics’ work. Mendoza et al. (2020), drawing on the work of Merton (1973) and Anderson et al. (2010) summarizes these norms as “aligned with the traditional view of scientists who engage in research objectively, autonomously and freely, who share knowledge openly through collegiality, and who do not seek personal advantage but rather advancement of science for the public good” (p. 1475). Admittedly, tensions exist around academics’ knowledge outputs, toward the public good on one hand, and their seeking of legitimization/prestige per these outputs on the other (e.g. tenure, promotion) (Mendoza, 2015), and there is surely concern that academia and academics have “lost sight of” their missions to advance the greater good. Opportunities for commercialization of faculty discoveries (a newer option for academics historically) may feel extra problematic for faculty and those evaluating them, who might see a goal of



commercialization as counter to serving the public good and as a historical threat to academic freedom (Gumport, 2002; Mendoza et al., 2020; Shane, 2004; Slaughter et al., 2005). While there is emerging research that challenges these concerns (e.g. Azoulay et al., 2009; Mendoza, 2012; Welsh et al., 2008), a shared value system based on these concerns among academics continues to inform their evaluation of their peers' work.

Most of us can envision a fairly typical promotion/tenure "packet" from the tenure-line of postsecondary faculty - the detailed CV, a personal statement, and representative work products like key publications. With an accompanying cover letter detailing context-specific norms, the faculty member's institution/department attempts to frame the faculty member's reality for evaluation by subject matter experts, both internal and external to the candidate's institution. Regardless of this attempt to frame what professional success looks like for candidates, we know that reviewers apply their value systems in their reviews, informed by cultural norms (Genshaft et al., 2016; O'Meara, 2002) around all facets of faculty work, including research, teaching and service (Bouwma-Gearhart, 2016; 2008). An inter-personal and -organizational linkage of value systems can inhibit fair review of faculty as well as inhibit it and any attempted adjustments to P&T-related processes and structures intended to better attend to faculty realities (Bouwma-Gearhart et al., 2021; O'Meara et al., 2015).

Yet, the inter-personal and -organizational linkage of value systems among academics can also be a linchpin in attempts to revise the larger system of processes and structures involved in the evaluation of academics' work. This potential is due, in part, to the phenomena of *isomorphism*, that explains and predicts how organizations respond to external pressures and, often, begin to resemble others. DiMaggio & Powell (1983) detailed institutional isomorphism across three mechanisms that can allow institutions to become more similar in processes and

structures to others in the same *field* (like those in higher education), defined as those with similar goals and related strategies (Bourdieu and Nice, 2010). *Coercive* isomorphism results from formal and informal pressures exerted on organizations by other organizations that they depend on (e.g. university accrediting bodies) or by cultural expectations within the social structures within which the organization operates (e.g. a country's higher education system). *Normative* pressures stem primarily from two aspects of professionalism, (1) standards dictating and accounting for certain formal educational programming and resulting discipline-specific knowledge and expertise (e.g. conferring of licenses and degrees), and (2) professional networks of these experts, that span organizations and allow discipline-specific diffusing of information between them (e.g. those united by disciplinary societies or academic journals). *Mimetic* isomorphism occurs when organizations are uncertain or ambiguous around their goals and, thus, imitate, adapt, or standardize their practices with other organizations they deem legitimate to establish and evolve the organization. Power is an important component of isomorphism, with certain organizations holding more sway with others per their perceived authority and legitimacy in relevant social structures. Powerful organizations (real or perceived) are often emulated.

Responding to and copying other external organizations can result in normalization across organizations, that can stymie their innovation. Yet the effects of isomorphism can be both negative and positive from the perspective of an organization, those that comprise it, and those it serves. Legitimation can result from influences of "softer power," versus oppression. Arguably more positive change can result from powerful organizations helping to make more humanistic processes and structures and innovations possible; for example, when an institution adopts policies and practices effective in supporting diverse faculty to be successful similar to those at other institutions. No doubt, we are in a moment where institutions of higher education

are anxiously trying to learn from each other's successes and mistakes as they respond to the societal devastation due to the COVID-19 pandemic. The mechanisms of isomorphism are active processes, with organizations modifying or adapting models to suit their particular needs or situation. The coercive and normative effects of isomorphism might not lead to homogenization but rather to variation among institutions per the translation of ideas by individuals and their organizations in response to their needs and desires (Sahlin and Wedlin, 2008).

Thus, isomorphism affords both normalization as well as innovation. In a sense, organizational isomorphism can serve both sides of the survival coin for institutions of higher education, allowing them to be both “an integrated part of a growing, and highly interconnected, internationalised and standardised higher education ‘industry’” via “standardization,” as well as innovative enough to be unique enough in mission to not be too redundant” (Stensaker and Dahl Norgard, 2001: 473). To understand how requires viewing change and stability not as a dichotomy but rather seeing an organization's concurrent attention to both. Stensaker and Norgård (2001) call this an *identity formation process* (475), as organizations continuously reimagine and make (often slight) changes to processes and structures (e.g. evidence utilized in their promotion and tenure systems) important to maintaining their identity among peers and their internal constituents. These changes are often motivated by new ideas to organizations and their individuals, with an idea's power somewhat dependent on the who, how, and when of their presentation, aligned with rules and power structures relevant to the organization and others in their field (Sahlin and Wedlin, 2008). Ideas are taken up as practices or structures, in ways appropriate to an organization's identity or as a challenging/modifying element to that organization's identity.

Institutional isomorphism is an important assumption of our research into the state of affairs of evaluation of faculty I&E in P&T considerations across institutions in the US. We assume these institutions, and their components, constitute an interconnected network of individuals and organizations that collectively reflect practices and mindsets, cultures and processes impacting P&T decisions of faculty across universities. In light of these assumptions and our research findings, we put forth and discuss goals and strategies that may afford change across academia to better recognize faculty I&E in P&T considerations.

### **Methods**

We implemented a survey to gain an understanding of the current terrain of factors relevant to the evaluation of tenure-line faculty members' I&E in P&T considerations across US institutions of higher education. Our 27-item survey included adapted items from previously validated research surveys (see McDevitt et al., 2014). Alongside items of our creation, our survey asked about faculty I&E in promotion and tenure policies and practices; how their institutions and organizations (e.g. department, discipline) are currently influencing this; the extent to which diverse institutions of higher education personnel value faculty I&E; how able they feel in evaluating it; relevant faculty and student training; and interests in collaborative efforts in integrating I&E in P&T. Survey drafts were reviewed by administrators and faculty representatives (across targeted institution types) for appropriate relevance and validity; suggested changes were discussed by the researcher group (paper authors, representing diverse disciplinary backgrounds and expertise) and adjustments were made accordingly.

We emailed the survey to 845 representatives from 377 institutions across eight Carnegie Classification designations (Carnegie Classification, n.d.), Doctoral Universities with Very High Research Activity (R1), Doctoral Universities with High Research Activity (R2), Master's

Colleges and Universities-Large (ML), Baccalaureate Colleges (BC), Tribal Colleges (TC), Medical Schools and Centers (MS), and Historically Black Colleges & Universities (HBCU), Hispanic Serving Institutions (HSI). Of these, some were I-Corps affiliated institutions (I-Corp). We sent the surveys to those assumed to possess relevant knowledge: upper administrators (provosts, associate/vice provosts, n=377), mid-level administrators (deans or heads of colleges, n=242), and NSF I-Corps university contacts (n=226). We sent up to two email reminders, roughly one week apart. We asked these initial contacts to forward the email with the survey link to others at their institution that they thought may possess relevant knowledge, and suggested some individuals for consideration, such as mid-level administrators (deans or heads of colleges), department chairs, and other relevant faculty (e.g., faculty senate presidents).

Of the 377 institutions targeted, representatives from 99 unique institutions responded, via 123 representative individuals, for an institutional response rate of 26%. (See Appendix A: Tables 1 and 2 for institutional and representative response). Final respondents included provosts (n=18) associate provosts/associate vice presidents of research (n=63), I-Corps affiliated contacts (n=20), and faculty leads and program directors (college-level and below) (n=14).

Data were downloaded from Qualtrics and analyzed using SPSS Statistics. Descriptive data analysis was performed across type of respondents, as well as type of institutions (See Appendix B for Figures 1-16). Chi-square tests of independence were performed to examine relationships between respondents claims of evaluation of faculty I&E in P&T at their institutions across five discipline areas—the applied and professional sciences, the formal sciences, the natural sciences, the social sciences, and the humanities.

### **Limitations**

We note various limitations of our exploratory research. For one, while we piloted survey questions to inform their clarity for targeted respondents, and provided definitions of survey terms, we do not know the degree of a common understanding of survey questions among respondents. As well, while we achieved a respectable institutional response rate, obviously our findings can only represent a subset of realities across institutions of higher education, and especially when considering that some institutional types were more (research universities) or less (most others) represented. Considering the plethora of institutions in the US, our findings are admittedly based on a very small sample, often just one individual from an institution, presenting individualized, and arguably limited and biased, experiences. For a few universities, multiple respondents may have further biased results. We acknowledge these limits to generalizability across our findings. Given some consistency across responses from those representing their institutions, however, we assume our findings can inform considerations concerning our foci, and implications for action around them. Indeed, interactions (described below) with individual representatives (many who were not surveyed) from institutions across the US, have demonstrated that our results resonate with their felt realities and needs of their institutions. Still, further research might explore pertinent realities at a larger array of institutions, and a larger array of their faculty (across position types).

## **Results and Discussion**

**Across institution types and professional positions, there is interest in the problem of recognizing faculty I&E within existing P&T structures and processes.**

Across position types, personnel at institutions of higher education think it is important to evaluate faculty members' I&E when considering P&T cases at their institutions; 79% (89/112) of individuals agreed or strongly agreed with the statement and I-Corp-affiliated personnel

always did (18/18) ([Figure 1](#)). Across institution types, when asked if others at their institution recognized this importance, the across the sample trend leaned slightly more positive, with 42% (49/116) of responses agreeing or strongly agreeing, versus 32% disagreeing (37/116). Those from R1s, BCs, and I-Corps reported more conflicted realities, with roughly half agreeing and disagreeing with this statement ([Figure 2](#)). Across institution types, there was general agreement that rewarding I&E in P&T cases is important for retaining faculty (57%, 66/116 indicating agree or strongly agree) ([Figure 3](#)). Overall, while it seemed that while there was plenty of interest to consider I&E in P&T cases, there seemed indication of desire and need to work to change norms at and across institutions to allow this.

Across personnel and institution types, about half (48%, 56/117) claimed some valuing of faculty efforts to develop students for careers that include I&E. Yet those at R1s and I-Corp affiliated institutions indicated almost equal disagreement as agreement with this statement ([Figure 4, 5](#)) regardless of survey data pointing to their faculty as most engaged in I&E activity, and a plethora of recent research showing the payoffs of such development for students in terms of knowledge, skills, and job prospects (in addition to citations earlier in this paper, see Mendoza et al., 2020, for review).

Across position types, institutions of higher education personnel generally felt themselves competent in evaluating faculty members' I&E when considering P&T cases at their institutions; 73% (80/110) of respondents agreed or strongly agreed with this statement. Yet respondents were less certain that others at their institutions possessed this competency, with similar amounts of agreement and disagreement and feeling neutral about this statement across the sample ([Figure 6](#)). Personnel that may assess faculty cases for P&T, across institutions and including at

those most likely to have significant faculty I&E work, can likely benefit from training in evaluating faculty members' I&E when considering P&T cases.

**Policies for evaluation of faculty I&E in considerations of P&T are lacking. When they do exist, the level they are found at varies by institution type.**

Across institution types, 69% (69/100) of respondents indicated there were no policy statements that existed to guide evaluation of faculty I&E counting in P&T, although R2s reported slightly more likelihood (7/13) of these policies than not (6/13) ([Figure 7](#)). For R1s and I-Corp affiliated institutions, these policies were noted present at about a third of those institutions, at about a fourth of MLs, and about a tenth of BCs. When policies did exist, they were most likely found at the department level at R1s and MLs, the institutional level at baccalaureate colleges (BCs), and either the school/college or department level at R2s ([Figure 8](#)). Few policies were being developed across institutions of higher education; 71% (81/114) of respondents indicated they knew of none in the works ([Figure S9](#)). The few being developed across institution type were mostly likely being done at the department level. Institutions of higher education are diverse in their internal handling of promotion and tenure evaluations, and in the use of policies to these (and organizational practices writ large). Still, the creation and institutionalization of policies around I&E in P&T considerations should not be ignored as key structural affordances that can help faculty understand and enact changes to P&T-related practices that will surely feel challenging to the cultural norms they are used to and, potentially, hold dear. And some institutions may need to sync policies at various levels (e.g. the department and institutional level) so that the various implicated review committees are evaluating P&T cases with the same I&E-related criteria.



**Some evaluation of faculty I&E in P&T considerations is happening, most often at the department level and dependent on the faculty field. When it happens, it is seen as a somewhat important consideration by evaluators, and an optional and flexible activity for faculty.**

An almost equal number of respondents claimed some evaluation of faculty I&E in P&T considerations is happening at their institutions as that claimed not ([Figure 10](#)). When it was noted as happening, across university type, chi-square tests of independence showed that respondents claimed it significantly more likely to be in cases of faculty in the applied and professional sciences (67%), the natural (65%) and formal sciences (62%), in comparison to those in the social sciences (29%) and humanities (17%) ([Table 3](#) and [Figure 11](#)). No significant differences existed between responses concerning the professional, natural, and formal sciences, or between the social sciences and humanities. Institutions hoping to promote and reward faculty I&E may need to attend to the diversity in the nature of work across disciplines, the cultural norms around what work is privileged within and across disciplines at their institution, and potentially construct and promote definitions of I&E that are inclusive.

Of known cases, 55% (43/78) of respondents claimed faculty I&E was perceived as a somewhat or very important factor at the institutional review level, compared to 61% (48/79) at the school/ college and 75% (66/88) at the department level ([Figure 12](#)). When I&E was considered in P&T cases, it was deemed optional (not a required faculty activity) by 78% of respondents (62/79), and deemed flexible by 63% (50/80) (to acknowledge high-quality faculty work in multiple forms) ([Figure 13](#)). These findings may point to various realities. Taken one way, they may point to a degree of flexibility in faculty I&E, and its considerations in P&T cases, that faculty and their organizations/institutions may feel important or necessary to ensure,

perhaps similar to the flexibility seen around notions of faculty scholarship at many institutions. Within P&T considerations, flexibility regarding the proportion of I&E in the larger body of a faculty member's work, and flexibility concerning the characteristics of the I&E work itself, may align with academic cultural norms that faculty promote, such as expertise and intellectual freedom. Taken another way, they may also point to a lack of structures or practices that have coalesced around shared conceptions of faculty I&E, and how this work can be evaluated.

**Training for evaluation of faculty I&E in P&T considerations, for both faculty and administrators, is practically nonexistent. Some training for faculty and postdoctoral engagement in I&E is happening, but support and training for students' engagement in I&E are very limited. Graduate students seem particularly underserved in terms of I&E training.**

Across institution types, scant training regarding faculty I&E was noted. Almost all respondents indicated no training for evaluation of faculty I&E for administrators (92% (104/113) or faculty (90%, 101/112) (Figure 14). Providing training in this area will be instrumental as more faculty become in need of peer review that can adequately evaluate this work, both within and across institutions. Faculty members, and the committees at their institutions charged to find qualified peer reviewers, may need supports to locate those who have experienced quality training in this arena and that are willing to provide peer review around I&E activities.

Sixty-four percent (64%, 72/113) of total respondents noted some training for faculty engagement in I&E across types of institutions, mostly at R1s (85%, 44/52) and R2s (86%, 12/14); of this, little training was noted as targeting underrepresented groups of faculty, with only 27% (31/113) respondents indicating this was available, most likely at R1s (37%, 19/51)

and R2s (43%, 6/14). Training targeting underrepresented faculty groups was atypical across the sample (Figure 15). Acknowledging the benefits to faculty who do engage in I&E, and interactions with the private sector/industry specifically, to not provide targeted training to groups traditionally underrepresented in the faculty ranks may further put them at a professional disadvantage compared to their peers. Training for postdoctoral engagement in I&E seemed fairly likely at those institutions most likely to host them, mostly at R1s and R2s (with 36/47 and 10/12 indicating this training was available at those institution types, respectively). Only 20% (23/113) of respondents indicated training for undergraduate students in engagement in I&E at their institution, more likely at MLs and BCs. Across institutions, little training for graduate students was claimed, with only 11% (12/113) indicating institutional availability, and R1s and R2s (where graduate students are found in higher numbers) largely void of this affordance (with only 6/59 R1 and R2 respondents claiming it) (Figure 16). Considering the numerous advantages for students per I&E engagement, and the evolving realities of the workforce, this is surely an area for improvement across institutions.

### **Implications Into Action**

The culture of academia continues to evolve to be more accepting, demanding even, of faculty I&E, towards enhancing the public good and economies. While concerns for this push exist, and need further consideration, other benefits of faculty I&E include those to the faculty members, themselves, their institutions, and students. Yet key processes and structures around the evaluation of faculty I&E, explicitly for faculty P&T, may still be lagging. Personnel surveyed from 99 diverse US institutions of higher education indicated room for improvements in:

- 1) Creation and implementation of practices and structures (including policy) to evaluate

- faculty I&E in P&T considerations, including I&E work with students;
- 2) Understanding of the realities and desires of faculty working across disciplines, the various forms that I&E may take per differences in discipline-influenced scholarship, and the nuance of evaluating I&E across ways of knowing and discipline-based cultures;
  - 3) Training those involved in P&T decisions to evaluate faculty I&E, including faculty and administrators; and
  - 4) Training faculty (especially from underrepresented groups) and students (undergraduates and graduate students alike) in participation in I&E activities.

The personnel across US institutional types that we surveyed were also interested in working together to potentially attend to these needs, and to generally problematize and support evaluation of faculty I&E in P&T considerations. Although the same in this exploratory study was admittedly small, we believe that, collectively, these institutions afford insight into realities of institutional commitments, policies, practices, and training (and not) for promoting I&E in higher education. Some of the institutions we surveyed may offer models from others to emulate or learn from. Indeed, some of our results are hopeful towards realizing evaluation of faculty that aligns with the I&E work that their institutions, and the larger society, are asking of them. The current P&T system in the cultural field of academia is based on norms concerning faculty work, including legitimacy conferred by peers who act per history of institutional isomorphism. As such, “counting” of faculty I&E in P&T considerations, for most institutions in the US, will not be possible without a critical number of their institutional peers, and those working at them, acting similarly.

Institutional isomorphism, in fact, might help secure systemic innovation around this issue, assuming some institutions with enough prestige among academics, working in tandem, provide templates for successful evaluating of faculty I&E in P&T considerations. Of the institutions who participated in our survey, seventy (70) indicated an interest in being part of the Promotion & Tenure Innovation & Entrepreneurship (*PTIE*) Coalition, an NSF-supported, non-binding alliance of institutions of higher education that share a common commitment to pursuing best practices for inclusively recognizing faculty I&E impact through the reward structure at US universities. Currently over 67 institutional members-strong, the Coalition is attempting an ecosystem approach to transformation (Dinwoodie et al., 2014). Via an interwoven network of change agents, the coalition intends to change a P&T system by attending to deep-seated cultural norms, partially by using institutional isomorphism as an advantage.

Work of the Coalition is already underway, with significant progress accomplished at a September 2020 Coalition Summit. From this summit emerged recommendations (<https://ptie.org/ptie-recommendations/>) that serve as a non-binding resolution and guides for Coalition institutions to 1) attempt to revise P&T structures (e.g. policies) and processes (e.g. the actual practices of those reviewing dossiers) at their institutions and, 2) collaborate with others in the Coalition to realize the important structures and practices needed across institutions per the P&T review norms in academia. Recognizing the limits of changing all norms in a cultural field of academia, the Coalition's goal is not to overhaul the traditional mechanisms for evaluating faculty. Instead, it hopes to have faculty and leaders in academia better recognized I&E in P&T by "broadening the bar" of privileged faculty work (National Academies, 2019). See <https://ptie.org/> for information on the Coalition, as well as our specific recommendations for relevant stakeholders.

Walking a “fine line” of attempting change within a system of strong and long-lasting cultural norms is surely a potential place of tension for the Coalition, one attempted to be addressed head-on with institutional Coalition partners via various Coalition activities, for instance via conversations about and critical attention to potentially related equity and inclusion issues. Coalition efforts, and related successes and missteps, will surely be of interest to many, and these will be tracked and studied, and explicitly against a theory of action based on using the propensity of institutions of higher education towards isomorphism, and their critical interconnectedness concerning tenure and promotion, and relevant cultural norms. Our future research will document over time the development, work, challenges, and accomplishments of this Coalition, as well as cases of affiliated institutions. In addition to studying the degree of success of the project writ large, our research team will continue to track the degree of relevant changes, and reasons for these, across the spectrum of US types involved in the initiative, with their varying identities, needs, and stature among peers. We hope this can inform those attempting revisions to P&T processes and structures, in general, and concerning faculty I&E specifically.

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## Appendix A

### Tables/Figures

	Total Representatives from Institution Type	Total Institution Type Responded/Contacted
Doctoral Universities with Very High Research Activity (R1)	57	46/121
Doctoral Universities with High Research Activity (R2)	14	13/36
Master's Colleges and Universities-Large (ML)	32	23/119
Baccalaureate Colleges (BC)	19	16/87
Tribal Colleges (TC)	0	0/11
Medical Schools & Centers (MS)	1	1/3
Totals	123	99/377

Table 1. Number of survey respondents from different types of institutions, and total number of institutions with any survey respondents. There were 13 institutions that submitted multiple survey responses from different personnel. The number of duplicate responses ranged from 2-8, with 2 being the median number of duplicates (R1: n=19, R2: n=2, ML: n=11, BC: n=5; where n = number of duplicates).

Institution Type	HBCU Responses/ Contacted	HSI Responses/ Contacted	I-Corps-Affiliated Responses/ Contacted
Doc Univ Very High (R1)	0/0	4/8	41/69
Doc Univ High (R2)	2/8	3/7	10/22
Master's-Large (ML)	2/9	1/25	0/2
Baccalaureate (BC)	2/6	0/1	0/0
Med. Schools & Centers (MS)	0/0	0/2	0/1
Totals	6/23	8/43	51/94

Table 2. Number and type of institution recognized as Historically Black Colleges & Universities (HBCU), Hispanic Serving Institutions (HSI), and/or I-Corps affiliated institutions that were contacted and responded (n=18 duplicate responses from I-CORP affiliates and n=2 from HSIs).

Discipline Area	Applied/ Professional Sciences	Formal Sciences	Natural Sciences	Social Sciences	Humanities
Applied/ Professional Sciences		0.3029 .582052	0.0411 .839323	15.1784 <b>&lt; .000098</b>	26.4176 <b>&lt; .00001</b>
Formal Sciences	0.3029 .582052		0.1223 .726578	11.2191 <b>&lt; .00081</b>	21.2993 <b>&lt; .00001</b>
Natural Sciences	0.0411 .839323	0.1223 .726578		13.7529 <b>&lt; .000209</b>	24.625 <b>&lt; .00001</b>
Social Sciences	15.1784 <b>&lt; .000098</b>	11.2191 <b>&lt; .00081</b>	13.7529 <b>&lt; .000209</b>		1.95 .162587
Humanities	26.4176 <b>&lt; .00001</b>	21.2993 <b>&lt; .00001</b>	24.625 <b>&lt; .00001</b>	1.95 .162587	

Table 3. Chi-square statistic/p-value from Chi-square tests of independence between respondents claims of evaluation of faculty I&E in P&T at their institutions across five discipline areas—the applied/professional sciences, the formal sciences, the natural sciences, the social sciences, and the humanities. For all calculations, degrees of freedom = 1; N=2; significance at  $p < .01$ . Bolded text equates to significant difference.

## Appendix B

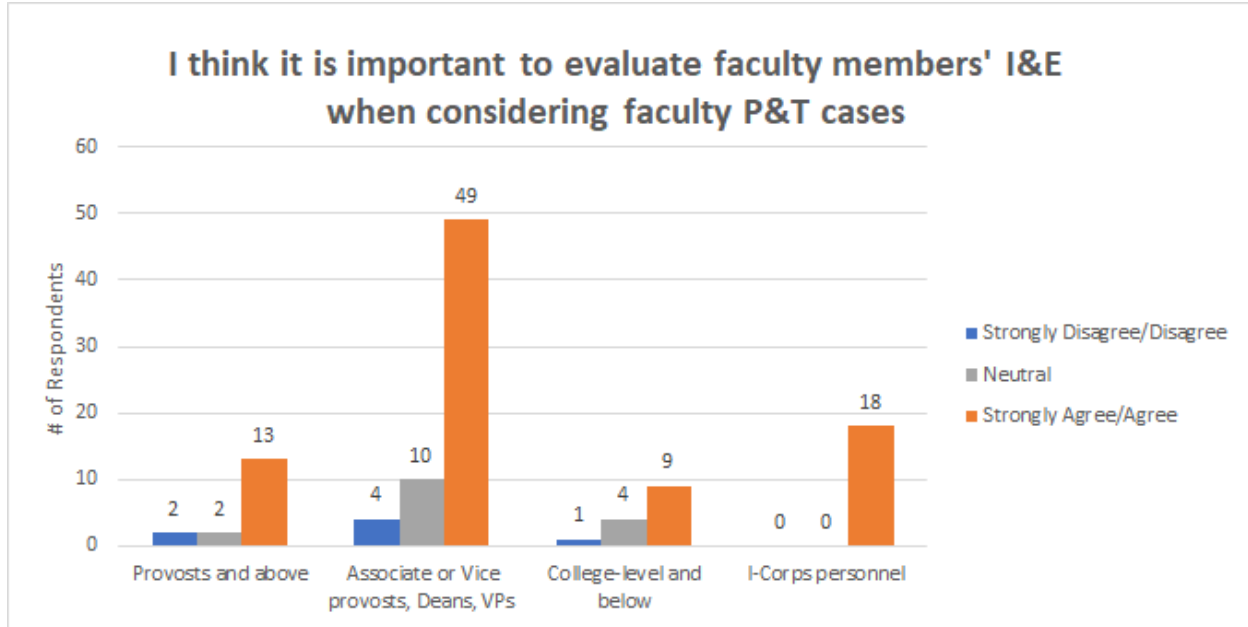


Figure 1. Comparison of IHE personnel's perceptions of the importance of evaluating faculty members' I&E when considering faculty P&T cases at their institutions.

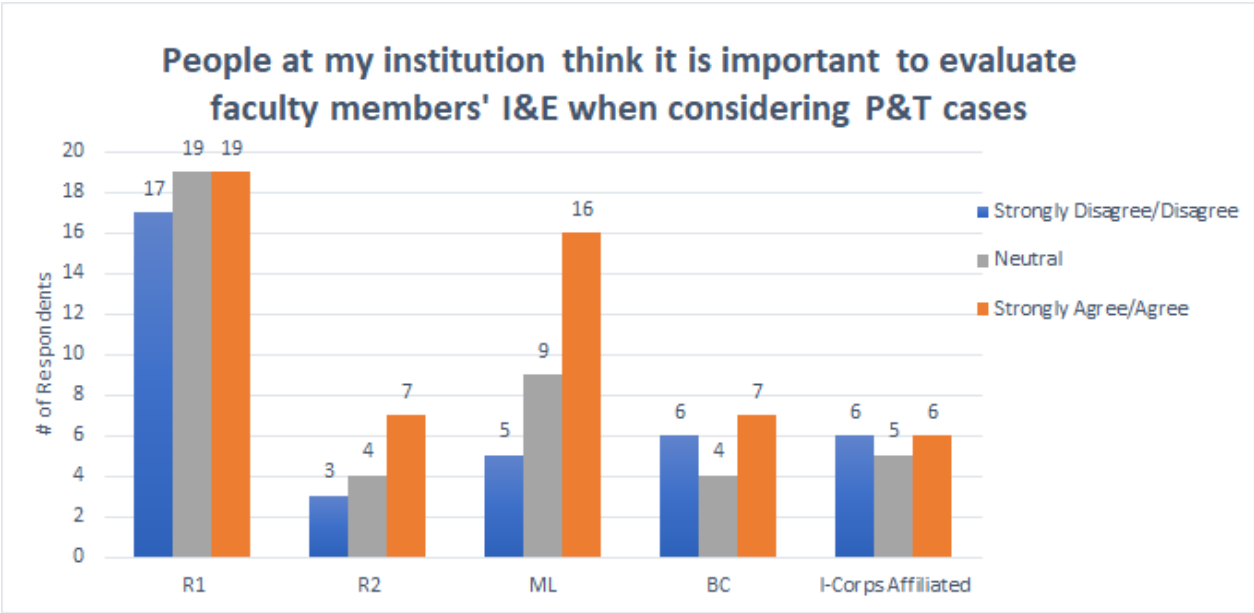


Figure 2. Comparison of respondents’ perceptions of how other people at their institution regard the importance of evaluating faculty members’ I&E when considering faculty P&T cases at their institutions.

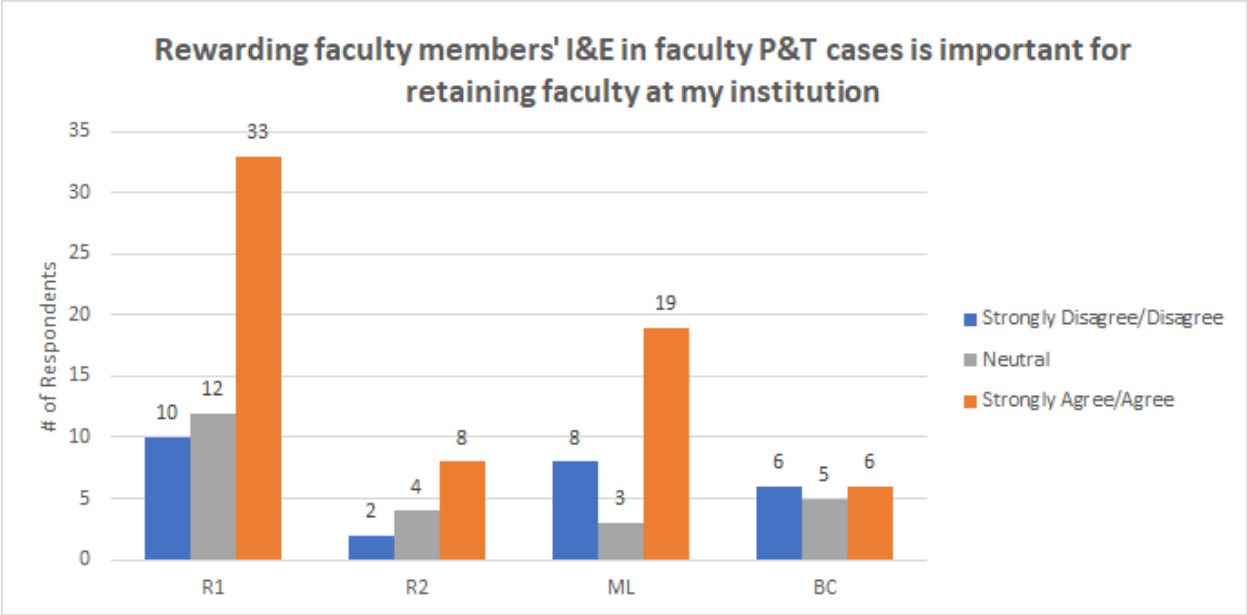


Figure 3. Comparison of institution type responses about rewarding faculty members' I&E in P&T as important for retaining faculty at the institution.



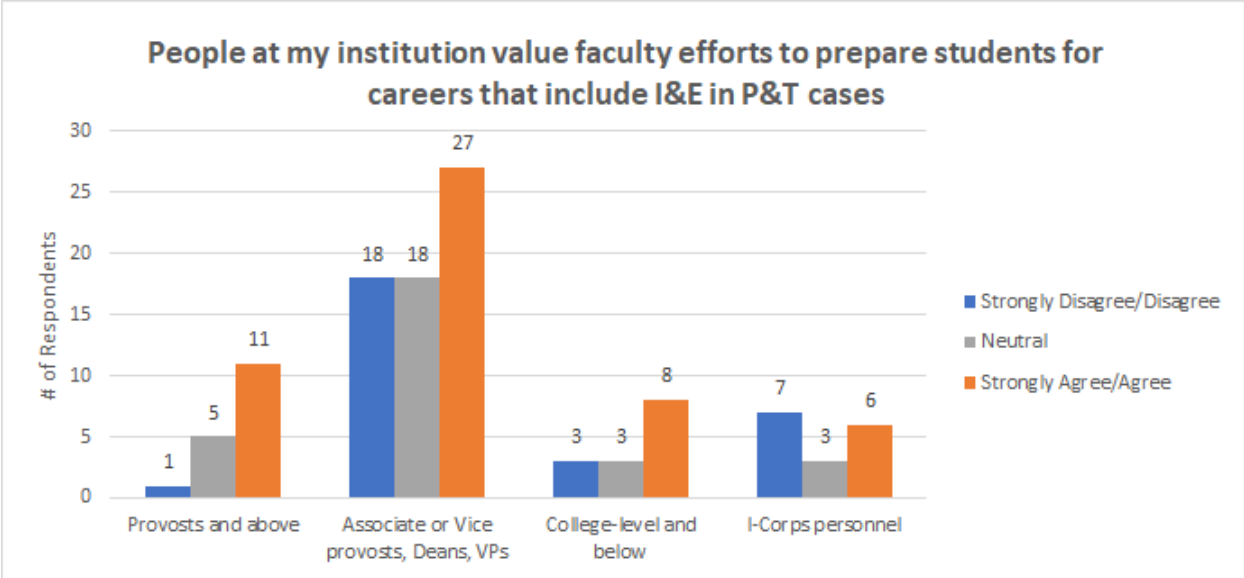


Figure 4. Comparison of respondents’ perceptions of how other people at their institution value in P&T cases faculty efforts to prepare students for careers that include I&E.

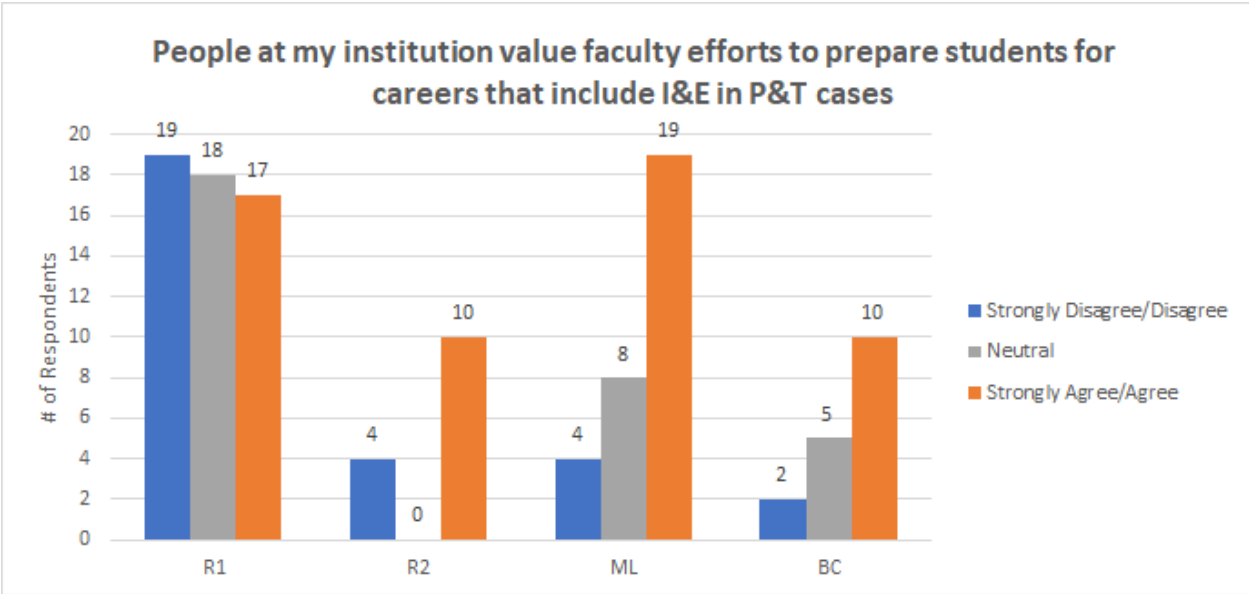


Figure 5. Comparison of institution type responses related to how people at their institution value in P&T cases faculty efforts to prepare students for careers that include I&E.



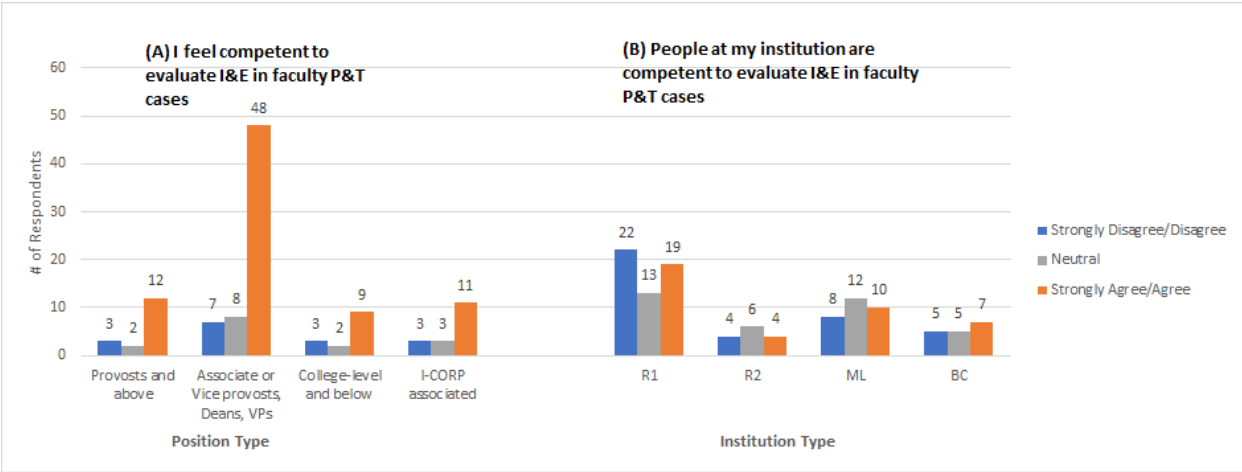


Figure 6. Comparison of felt competencies by position types in evaluating faculty members' I&E when considering P&T cases (A) and the same sample by institution types, the degree to which they felt others at their institutions possessed this competency (B).

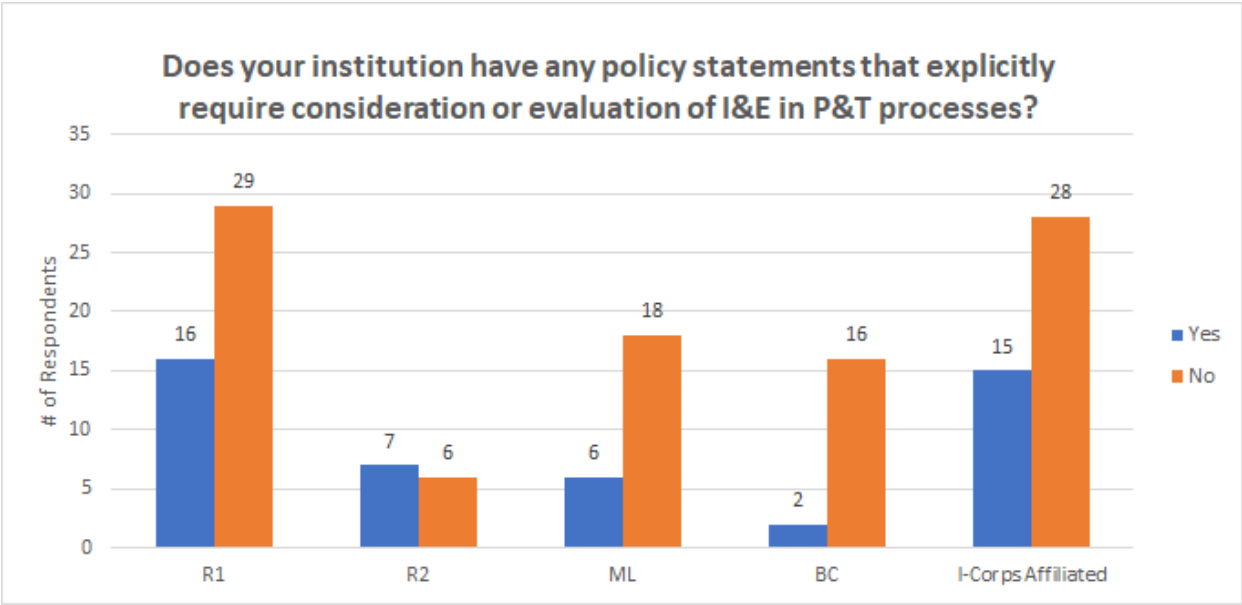


Figure 7. Comparison of institution type responses, including I-Corps affiliated institutions, on the existence of policy statements that require consideration or evaluation of I&E in P&T processes at their institutions.

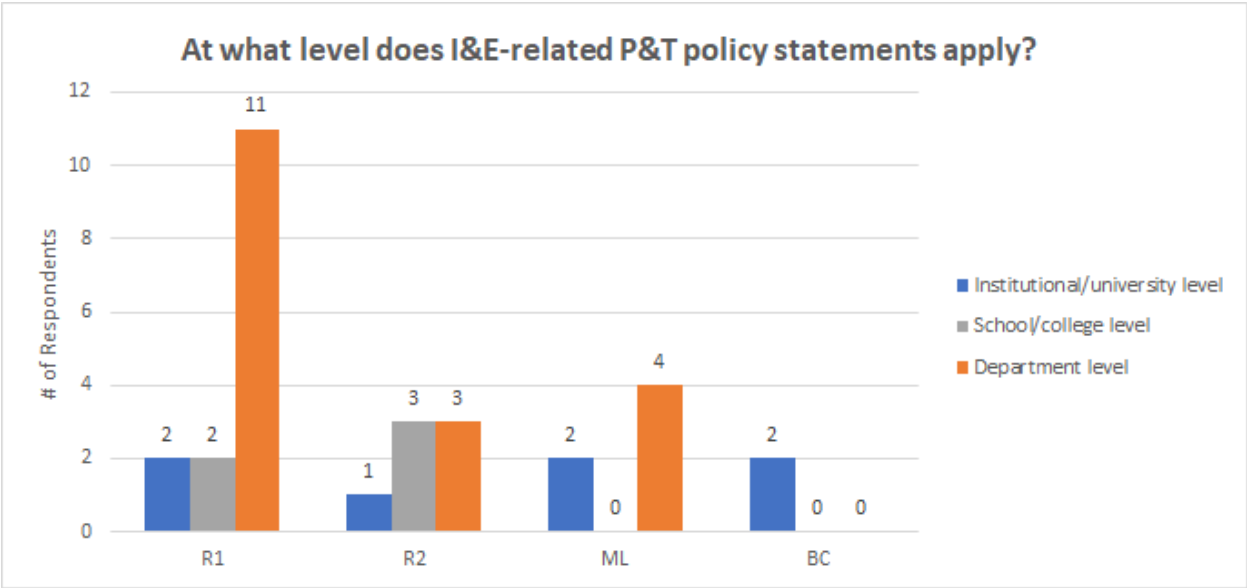


Figure 8. Comparison of institution type responses of the level where I&E related P&T policy statements apply at their institutions.

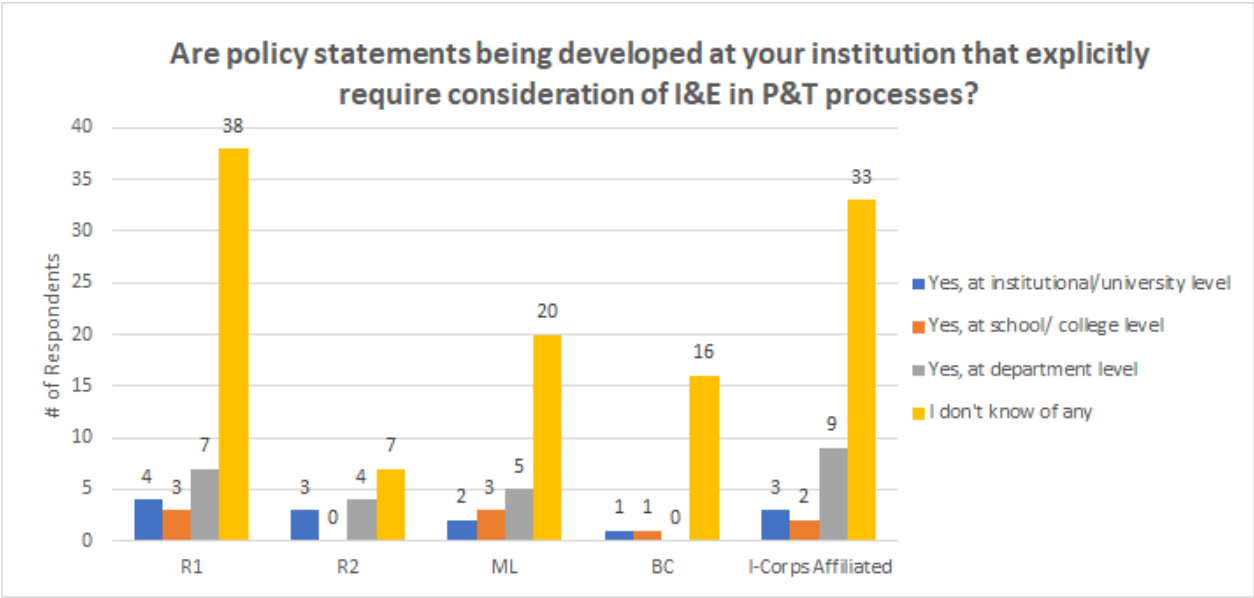


Figure 9. Comparison of institution type responses, including I-Corps affiliated institutions, whether policy statements are being developed that require consideration of I&E in P&T processes at their institutions.

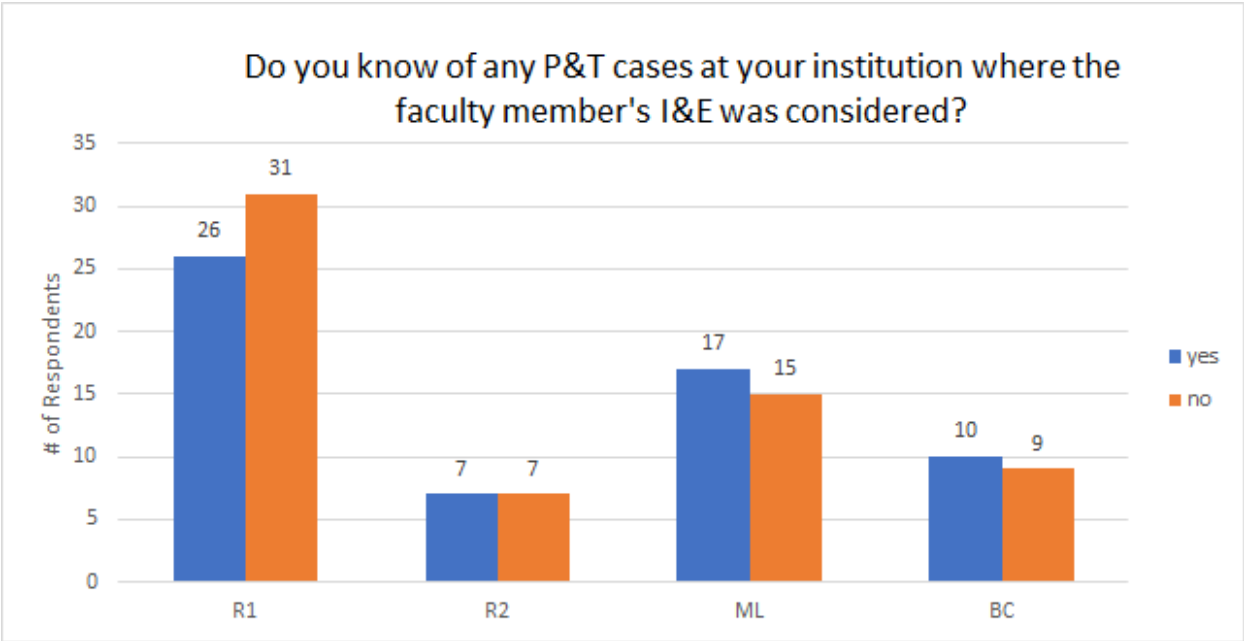


Figure 10. Comparison of institution type responses of P&T cases where faculty members' I&E were considered at their institutions.



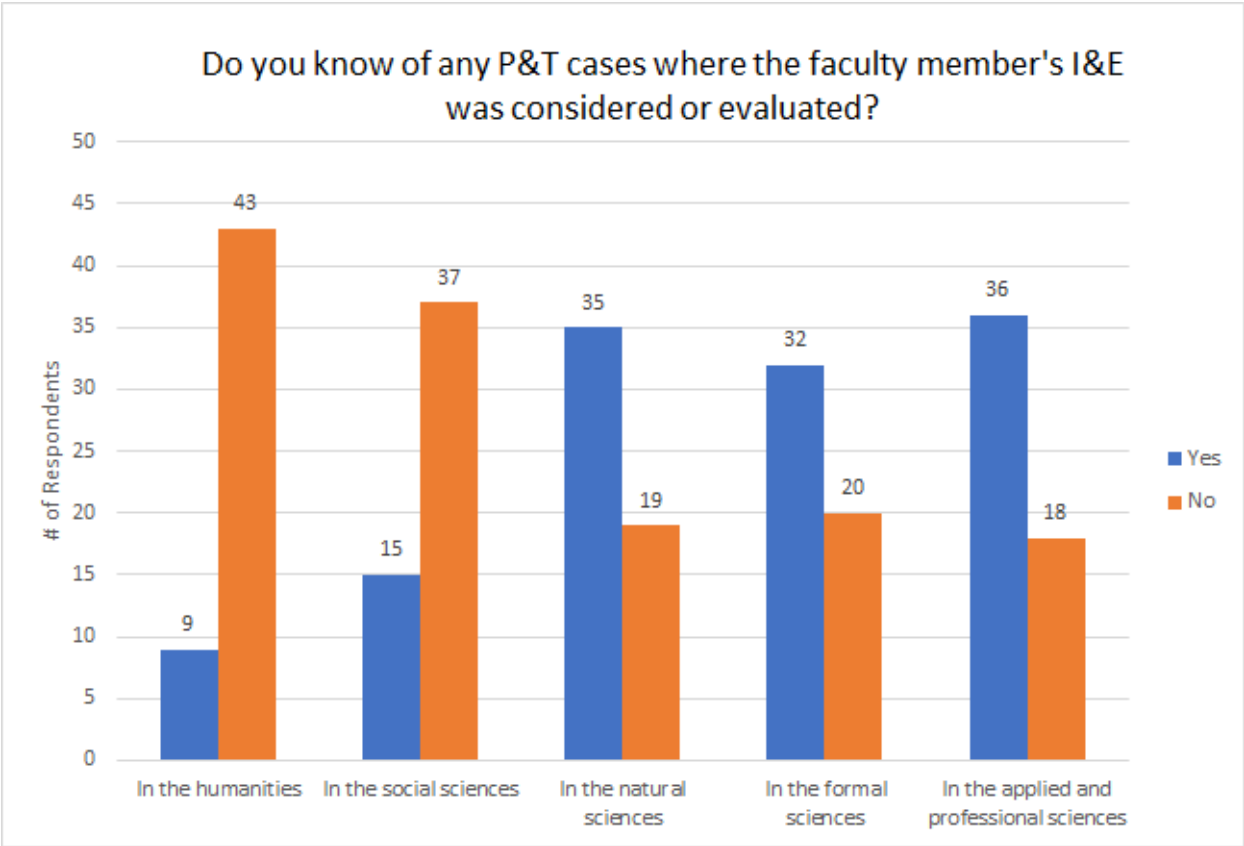


Figure 11. Comparison of I&E considerations in P&T processes across disciplines at respondents' institutions.

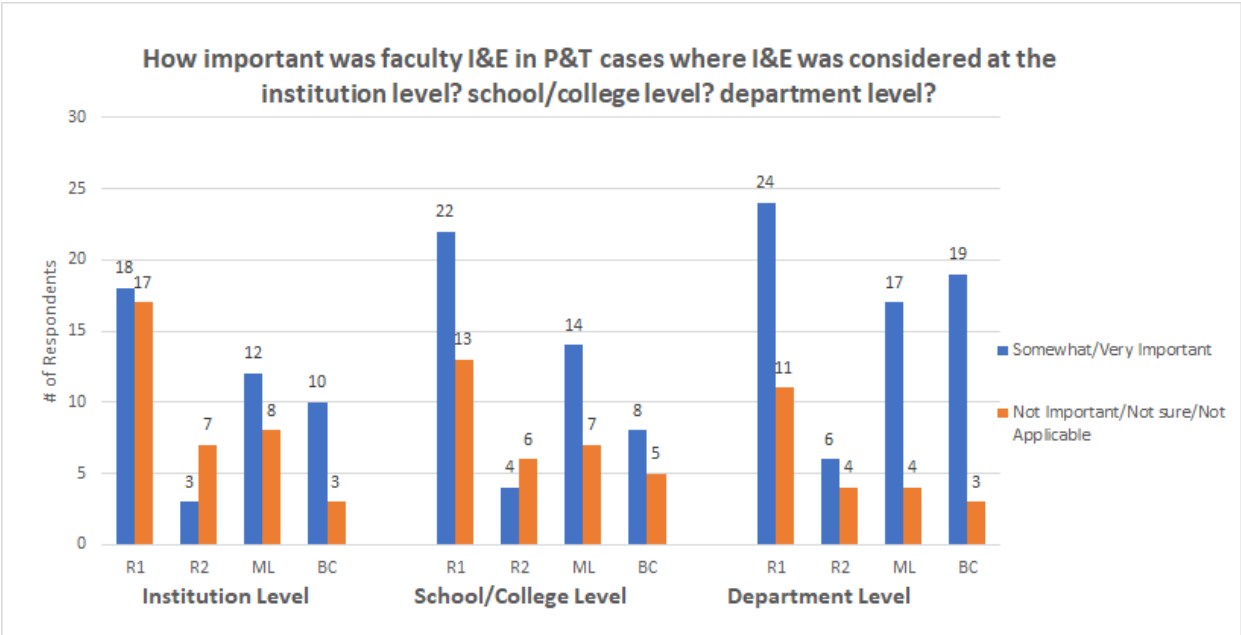


Figure 12. Comparison of institution type responses of level of importance of faculty I&E in P&T cases at institution, school/college, and department levels at their institutions.

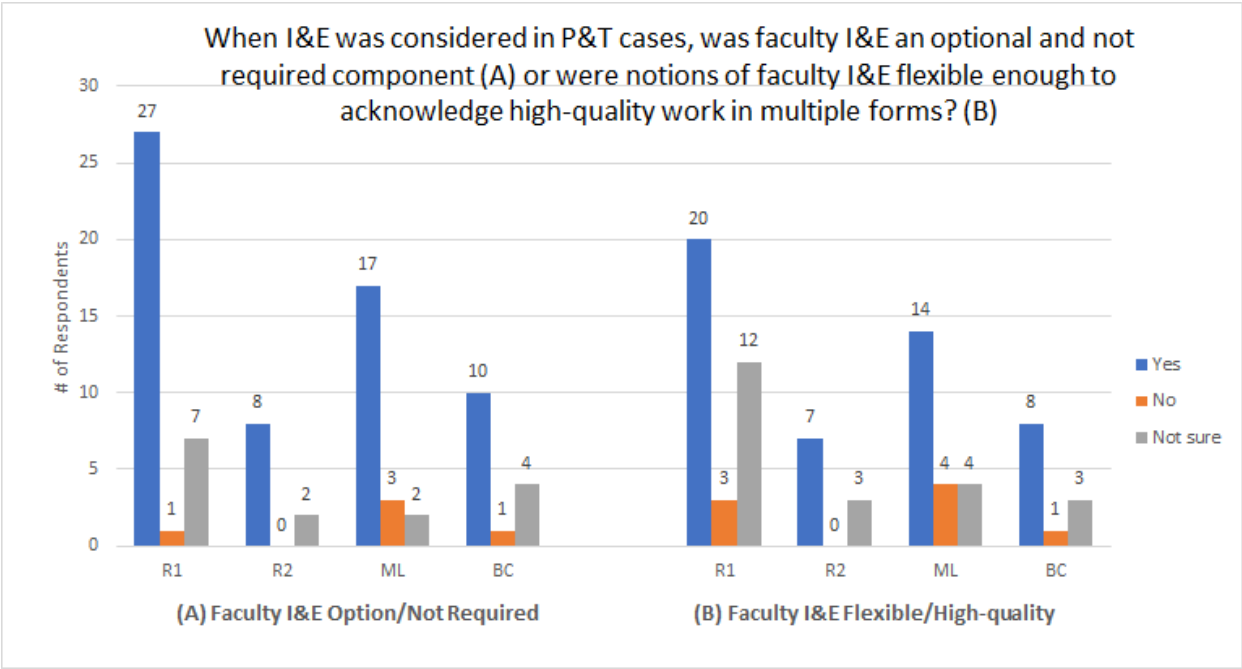


Figure 13. Comparison of institution type responses of the optional and flexible nature of faculty I&E when it was considered in P&T cases at their institutions.

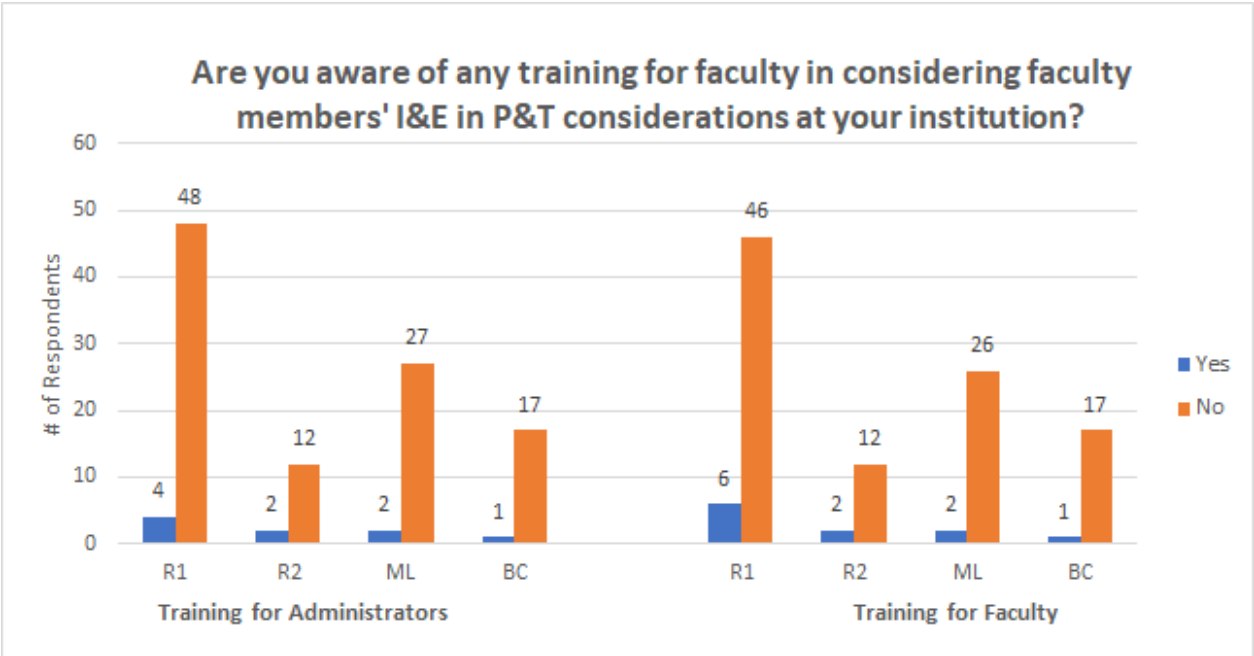


Figure 14. Comparison of institution type responses of the awareness of any training for administrators or faculty in considering faculty members' I&E in P&T considerations at their institutions.

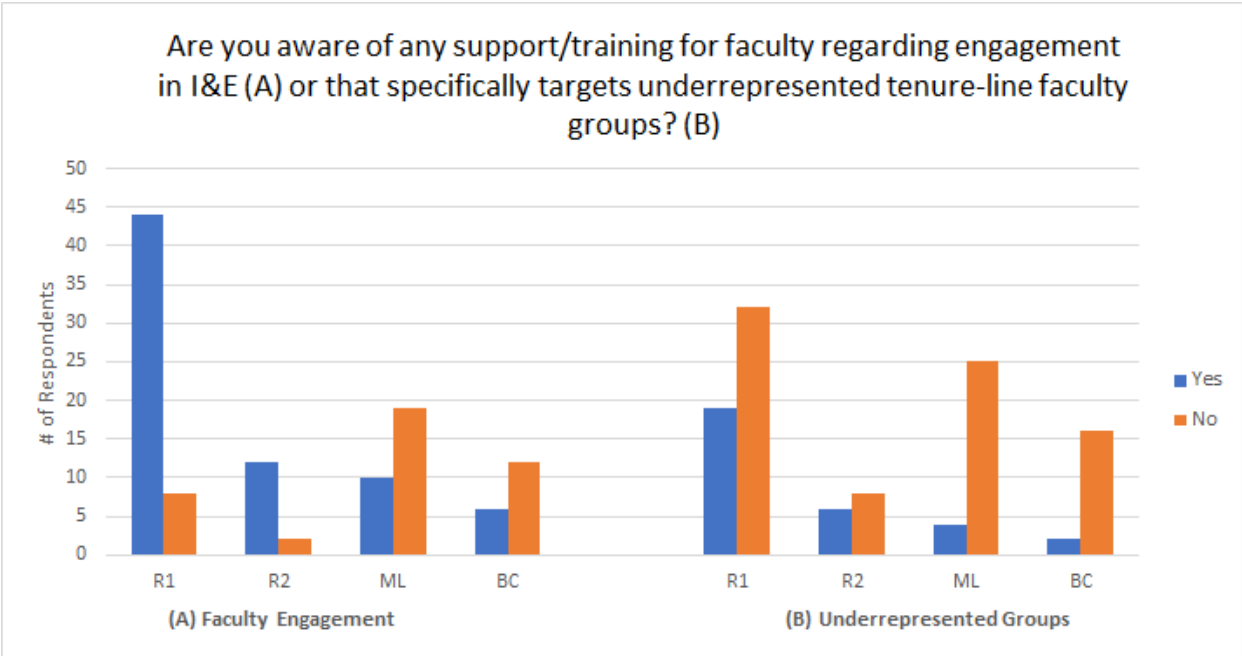


Figure 15. Comparison of institution type responses of awareness of support or training at their institution that specifically targets faculty engaging in I&E or underrepresented tenure-line faculty groups (e.g., women faculty, faculty of color) engaging in I&E.



Figure 16. Comparison of institution type responses of known awareness of support or training at their institution for students or postdoctoral employees regarding engagement in I&E.