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On faculty development of STEM inclusive teaching practices

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One sentence summary: In this article, I propose a more comprehensive approach to faculty development efforts of postsecondary inclusive teaching practices.

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ABSTRACT

Faculty development of inclusive teaching practices has become more common in response to significant differences in STEM student retention between underrepresented minorities in the USA and students from other ethnic groups. Approaches to solve this have shifted from focusing on student deficits to changing campus culture, including the mindsets of instructors who teach STEM courses. In this article, I argue that based on the literature informing the conceptual frameworks used for faculty development in inclusive teaching, faculty developers should reframe the message of their workshops to focus participants more on the scope of the journey, and shift the direction of overall efforts some to redevelop pedagogical training at the graduate and postdoc levels. Informed by historical as well as recent theories on the role of higher education to society, I highlight the areas of the literature that can effectively inform our current approaches to inclusion. I also briefly review the reasons why this approach is needed, and include suggestions for new faculty development approaches for long-term sustainable change in STEM inclusive education at the postsecondary level.

Keywords: inclusive teaching; faculty development; STEM; underrepresented students

INTRODUCTION

Institutions of higher education in the USA are still struggling to retain underrepresented minorities (URMs) in STEM disciplines in the first 2 years of matriculation. A recent report by Chen and Soldner (2013) concluded that a black student not retained in his/her STEM major (by virtue of failing or withdrawing from their introductory STEM course) had a 67% chance of not earning a Bachelor's degree at all. For a white student, this probability was 47.9%. This unfortunately is not only a recent finding. Almost two decades ago, a multi-institutional study was launched to investigate a similarly troubling attrition rate (average 51% for the STEM disciplines; Seymour 2000). The authors found that the structure of the first-year learning experience might possibly explain why 'switchers' (those who left the major) had low confidence in their abilities to pursue careers in STEM fields. Not only has the gap in attrition rates between ethnic groups remained,

but more recent studies have showed that sense of belonging continues to be a major predictor of success in STEM courses (Booker 2016). The STEM education process may have become more equitable in its accessibility, but is still inequitable in terms of success for all groups. Concomitantly, the ratio of URM students to white students are increasing at the secondary level, meaning that the ratios of URMs to current majority populations in the USA will adjust at the postsecondary level in the years to come (Fry 2007). Therefore, as we move forward, higher education administrators may have to adjust their assumptions of the traditional demographic backgrounds of their incoming students. As the evidence builds for the supportive role that inclusive environments and activities play in engineering success for all students (Kuh et al. 2011), institutions of higher education need to provide faculty and staff with professional development opportunities for them to gain expertise in this area. The

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thinking here is that in inclusive classrooms URM students will feel more connected to their peers, the instructor and the campus, and they will then be more likely to be successful in their STEM major pursuit (Ostrove and Long 2007; Palmer and Gasman 2008). The literature on social belonging interventions in this population supports these ideas (Walton and Cohen 2011; Yeager and Walton 2011).

Inclusive pedagogy has come to represent a number of things loosely associated with the retention of URM students (Florian 2010; Florian and Black-Hawkins 2011). In this article, I define it as 'a philosophy of teaching that provides equal opportunities for all students to have a successful learning experience'. This paradigm places a certain burden of responsibility on institutions and faculty to specifically understand how conventional pedagogies generate inequity, and how a fuller understanding of themselves and the students can better leverage the psychologies needed for an engaging successful learning experience. Rightly, universities have invested in supporting their faculty to shift their thinking to consider these approaches as part of their teaching. In response, many faculty development opportunities on inclusive pedagogy have emerged, a consequence not entirely dissimilar to the increase of faculty development opportunities on active learning after the publication of 'Vision and Change in undergraduate biology: A call to action' (AAAS 2011). The implied goal with this push is to encourage existing faculty to think a little differently about their students and their overall pedagogical approach not limited to curriculum design and greater focus on effects within the classroom. There are conceptual frameworks that have helped guide inclusive teaching faculty development efforts that are specific for higher education. Marchesani and Adams (1992), for example, proposed a model around which some inclusive pedagogy workshops are developed. This quadrant model asks faculty to critically analyze their own psychologies, understand more broadly situational factors around their students, create inclusive classroom climates and design curricula that foster greater sense of community. This model (which I have used in my own faculty development work) challenges faculty to consider the various aspects of the teaching experience, arguing essentially that an overly explicit focus on one aspect is insufficient to meet the needs of a truly inclusive, high-quality learning experience. Other models like Multiple Intelligence Theory (Barrington 2004), and Culturally Responsive Teaching (Gay 2010) that overlap conceptually with this approach, vary in terms of the degree they developed for higher education. It is not my goal here to review these approaches, but to discuss a critical consideration in inclusive teaching faculty development practice that is a function of a more fundamental paradigm that needs shifting, than with the models themselves.

Current graduate training models in STEM are predicated heavily on large time investments in developing the academic behavior and skills of a scientific researcher (Tanner and Allen 2006). A shockingly small percentage of that time is spent developing skills in pedagogy, especially considering the fact that a semi-explicit goal of these programs is to produce PhDs who can be effective academic faculty members, a position that typically involves significant teaching (Austin 2002). There have been some recent positive changes to this culture. Some post-doctoral programs offer opportunities for classroom teaching along with research opportunities so that future faculty members can try and fail at pedagogy and retool accordingly before becoming assistant professors (Sales et al. 2007). Some graduate programs now offer courses in pedagogy (Tanner and Allen 2006; Baumgartner 2007) or allow students to obtain 'teaching certifications' in collaboration with centers for teaching and learning.

While the above are steps in the right direction, they are likely only a beginning if the ultimate goal is a seismic shift in the role that inclusive pedagogy will play in reducing URM attrition from STEM disciplines.

After several national reports in the USA encouraged a greater use of active learning as part of postsecondary science education reform, universities were tasked with training faculty on using this type of instruction. Similarly, inclusive pedagogy faculty development has gained in popularity because prior to beginning the professoriate, faculty tend to have little experience in this area. In this vein, the long-term goals of the inclusive teaching movement should be to provide quality professional development for current faculty, and also promote the transformation of pedagogy training of pre-instructors. This way, development helps engineer a paradigm shift among current practitioners, and creates a pathway for inclusiveness-minded instructors for the future. At its heart, inclusive teaching development frameworks focus on relationships. They demand an understanding of the histories of the stakeholders before teaching strategies can be determined appropriate for a situation. It would be impractical to expect, within the timeframe of most professional development workshops, that full understanding will be achieved. Current STEM graduate programs in the USA are mostly devoid of robust pedagogical training (Tanner and Allen 2006); therefore, faculty development on this issue might occur only when the individual is already in the classroom. This means that while inclusive teaching should continue to promote best practices and proven strategies toward developing inclusive climates (for examples, see Tanner 2013), they should also lay out clearly the depth and scale of the understanding instructors need if full competency is to be achieved in this area. Absent of this, inclusive pedagogy training will only contain superficial approaches to the concept. Simultaneously, inclusive teaching development should focus more on the transformation of pedagogy training at the graduate and postdoc level, arguably the best strategy to create a new generation of differently minded instructors. This wholesale transformation might necessitate the elimination of terms such as 'inclusive teaching', and rethink pedagogy training such that a full understanding of the social context of learning is deeply integrated in the development process. Terminology while useful can create a sense of 'other' or 'type', where the term becomes a separate brand to the main exercise. In this article, I discuss how faculty developers can re-envision how (i) pedagogy is developed at the graduate level and (ii) to send a clearer message to existing faculty on inclusive practices. The literature suggests that we dissociate broader social structure and the social dynamics of the classroom at our peril, and full engagement in the latter requires a deep understanding of the former. I discuss that link here, focusing on why understanding the depth of the relationship is a critical component of the ways in which faculty should be thinking about inclusion. Through this examination, I emphasize the ways in which our current approaches on faculty development of inclusive pedagogy skills may need upgrading and more in keeping with the realities of current and historical social structures.

DEFINING INCLUSION

Faculty developers of inclusive teaching practices need to be clearer about what the term 'inclusive' actually means. In practice, it has been used to promote strategies that provide a boost to historically marginalized groups so that they can more effectively engage in the learning process. The disproportionately

higher attrition of URM students may tempt an explicit focus on this particular group. There are a few critical issues with this. First, it creates an artificial sociocultural hierarchy, arbitrarily assigning the dominant culture (the group currently being well served) a normative status to which the marginalized must aspire. It offers no critiques of the mainstream pedagogy and its inherent exclusivity. Secondly, when interpreted out of context, in a superficial sense it still somewhat subscribes to a deficit model. It can assume that there are specific deficits with the marginalized which, when plugged, can eliminate the sense of exclusion that STEM classrooms can create. Many of these 'deficits' include identity contingencies associated with the underrepresented group (Crocker, Niiya and Mischkowski 2008) and addressing them are certainly an important part of a holistic approach, but a hyperfocus on addressing 'the student' can preclude the need for other stakeholders, especially instructors to examine their own contributions to the process, especially with respect to their cultural competency. Thirdly, inclusive pedagogy training that creates instructors hyperfocused on historically marginalized groups can have the ironic effect of creating *more* resentment of those groups by majority classmates and/or instructors. This is the potential result when inclusiveness is defined as a focus on a subset of identities (the historically marginalized) within the classroom. If inclusive pedagogy approaches do not engage the social contexts of non-minoritized populations, there will remain a probability for backlash. This potential effect was discussed as early as the 1960s, then with respect to affirmative action. Kaplan (1966, but see Elden 1969 for a rebuttal) warned that the legalization of identity politics will undoubtedly create a pushback effect from the majority, who, without a full understanding of the law's context, will themselves feel discriminated against and marginalized. The effect of this contextual nuance has been seen more recently in corporate diversity trainings (Von Bergen, Soper and Foster 2002), where some implementations of the diversity training actually increased racial resentment (Kalev, Dobbin and Kelly 2006).

To be fully inclusive, pedagogy has to engage both majority and minority students. It should consider the systemic problems that have resulted in our current URM retention struggles, and also address the shared histories of all students in the classroom such that the social conditions that generate identity contingencies are understood as a collective responsibility. Faculty training on inclusive practices, especially components that encourage a deeper understanding of the students, should strongly promote intercultural knowledge. It should not solely focus on deficits of the disenfranchised, but also on opportunities for students to learn and grow from the diverse authentic experiences of their peers. The development of inclusive classrooms that promote sense of belonging means that all students must belong. The transformation of classroom culture to create greater inclusion may fundamentally alter the conventional characteristics of these classrooms. Specific strategies that promote inclusive environments in STEM classrooms such as using multicultural examples (Chamany, Allen and Tanner 2008), or developing targeted exercises for teaching students how to work in teams, can be viewed as part of an overall structural departure from the traditional STEM course delivery. An inclusive approach should be one where the histories of both the privileged and disadvantaged are engaged with and understood more fully. Such an engagement requires a full understanding of how the intersections of those histories, with all its fractiousness and resilience, have come to inform the structure of the world today. Conceptually, engaging in totality would mean placing a common identity (in this case national identity) above the subcategories (race,

gender, etc.) that have historically informed people's American experience. Disadvantage experienced by any group in this context will be viewed as an American problem, and not one defined by a particular group. This paradigm shifts the focus of inclusion from the underperforming or disadvantaged group in the classroom toward seeking a better understanding of shared histories. Beyond a 'pedagogy for the oppressed', inclusive practices can provide a platform upon which there is greater understanding between participants who exist in different spheres of the social power structure.

Creating a classroom atmosphere where these intercultural connections are fruitful and educational is no simple task, but there is a rich history of the study of cultural assimilation in America that faculty developers and instructors can learn from. This scholarship underscores the fact that the ways in which new groups attempt to assimilate with an existing social structure are varied (Alba and Nee 1997). However, achieving equity between groups may require deep alterations of the power structure that exists at any given time. Understanding the dynamics of these structural shifts is critical to its replicability in other settings, including the college classroom, and therefore it is to this area of scholarship we now turn our attention.

THE SOCIAL CONTEXT OF STEM EDUCATION

Faculty development models of inclusive teaching request participants to consider more carefully the role that their own sociocultural histories and those of their students play in the classroom relationship (Marchesani and Adams 1992). A full understanding of this relationship requires participants to consider the sociological and psychological frameworks used to study the connection between history and identity. Among faculty developers these frameworks are well known. Stereotype threat (Steele and Aronson 1995), implicit bias (Greenwald and Krieger 2006), sense of belonging (Hurtado and Carter 1997) and values affirmation (Miyake et al. 2010) to name a few are all predicated on the notion that social history in the USA has had unequal outcomes for different groups, and that this inequity has resulted in attitudes and perceptions that potentially create social barriers within the STEM classroom. Faculty developments on inclusive teaching include some exposure to these conceptual frameworks, but are likely to lack the time to engage participants deeply with the social contexts that dictated the frameworks' development. This can perpetuate a 'best practice' approach to faculty development on inclusion, which has some use, but lacks the deeper understanding of social assimilation history necessary to ingrain a full understanding of the subject matter. To this end, faculty developers can ask practitioners to begin their journey toward a fuller understanding by asking—(i) how assimilation of diverse groups has occurred in the social history of the USA, (ii) the relationship between that assimilation process and higher education and (iii) the specific ways in which our understandings of this relationship can inform our praxis.

Cultural assimilation in the USA

Any practical consideration of inclusive approaches should include a critical examination of the history of cultural assimilation within the USA. Such an examination would include an understanding of the chronological history of the assimilation of different cultures within broader US society as well as a critical look at the theoretical frameworks used to better understand these assimilation patterns. Some amalgamated works in this

area may provide a useful starting point to understanding this history. In 'A Different Mirror' (Takaki 2012), for example, the author describes a multigenerational history of immigration and cultural assimilation in the USA. He explains that as various ethnic and cultural groups arrived, whether involuntarily or by choice, the ways in which integration occurred or the degree to which it happened at all was largely dependent on the views of the social power structures of the day. The integration process was rarely a linear one, and was sometimes further complicated by now mostly antiquated views on the relationship between race and intelligence. The result has been an uneven pathway for most groups from immigration or slavery status to being viewed in full equality as an American (Berry 1997). Some might argue that for some groups this pathway is still in process (Yoon *et al.* 2012). It is important to understand therefore that 'sense of belonging' only makes sense as a concept when the normative culture serving as a reference point is clearly defined. If the reference point of 'belonging' is being 'American', then the challenge is figuring out what this label actually means (Schildkraut 2007). The literature suggests that the social articulation of this has varied in both time and space (Phinney 1996). This means that any consideration of the concept of 'belonging' must include an examination of the overall social structure of the local community. Additionally, the evolution of social belonging on a national scale has impacted the degree to which various subcultures have been able to integrate into various social institutions. Faculty development on inclusive teaching should be deeply reflective of this integration process for higher education, and thus consider why the evolution of belonging in general matters for our classrooms and profession.

Social structure and higher education

The relationship between higher education and evolving social structures can be argued to be a cyclical one. Existing social structures influence to a large degree the demographics of student populations, the chosen research foci at universities, and the nature and style of the pedagogy (Naidoo 2004). In turn, universities act as intellectual vehicles, broadening our understanding of ourselves and our society so that we can make more inclusive, collective decisions that benefit all citizens. Many authors have considered the philosophy of the relationship between higher education and its role in solving or perpetuating social structures (Brennan and Naidoo 2008). More practically, faculty need not look very far back into history to see how society and classroom structure are inextricably linked. The passing of the Civil Rights Act, the American Disabilities Act and Title IX legislation are all examples of how law profoundly influenced the demographics on college campuses (Ladson-Billings 2006). Prior to these bills, college classrooms were dominated by a phenotypically monolithic culture. The change in legislation forced a fractious higher education integration process that was historically exclusive. While legislative changes were somewhat reflective of broader social upheavals that were taking place through the decades, laws alone do not necessarily engineer paradigm shifts (Wilkinson III 1995). Legislation helped create access, but when historically underrepresented or marginalized newly occupy a majority space all parties need to rethink how that space is defined. Therefore, when faculty developers ask instructors to *know* their students, that knowledge should be contextualized within the re-configuration of these social spaces. It is only after there is a full engagement in this social history, that instructors can reliably make deep transformations to their practice.

Faculty development of inclusive practices

Implicit in faculty development of inclusive practices is an assumption of a facilitative approach to pedagogy. Freire's (1968) discussion of dialoguing as a means to create equity between the instructor and the instructed, and in general a more facilitative classroom is useful even in contemporary contexts. It is truly unfortunate that decades after Freire argues against the 'banking' concept of pedagogy as a means of oppression, national reports (in STEM) are still needing to urge instructors to move away from unidirectional instruction. In Freire's model, the denying of dialogue limits the scope of the education experience, and perpetuates existing hierarchies (Freire 1972). The art of dialogue as a pedagogical tool is relevant to our efforts at promoting inclusion. If engaging through dialogue is inherent within the pedagogy, the instructor will always be primed to consider the experiences and histories of the students in the teaching process. Faculty developers of inclusive practices should explicitly encourage faculty to revisit some of the earliest discussions on education viewed then as a vehicle for liberation (Freire 1989), and the promoter of democracy (Dewey 2004). In considering this liberation pedagogy, faculty should be mindful of the role that both their own psychologies and the situational factors of the students play in fostering academic success. By asking instructors to engage more deeply in the social history of integration and assimilation through dialogue, faculty development of inclusive teaching is essentially challenging instructors to develop relationships. These relationships are not necessarily with individual students, but with the social context of the instructors' own selves *and* the student. This includes understanding the historical and contemporary sociological frameworks that inform the social context of learning. The effects of a potential paradigm shift on praxis can be significant. Some studies suggest that even low-level improvements in our understanding of a framework like implicit bias, for example, can augur behavioral change (Lebrecht *et al.* 2009). This should not discount the need for specific, proven long-term strategies, but understanding local contexts would put the instructor in a better position to automatically determine inclusive approaches for their own particular teaching situations. Faculty development on inclusive teaching may serve instructors better if, while providing useful tips, focus on understanding inclusion as a journey to which the participant must commit. It is here though that the demands of this engagement meet the realities of available time, mental bandwidth and professional development resources for practitioners (Sorcinelli 1994). It would be impossible therefore to consider a rethinking of inclusive teaching faculty development without addressing the overall environment in which pedagogy training generally occurs.

SUGGESTIONS FOR THE FUTURE

The continued disparities in STEM performance between URM students and other ethnic groups in the USA demand our sustained critical attention. While inclusive practices in principle should be practiced across the curriculum, demographic-related performance gaps in STEM points to a particular need for a deeper incorporation of these approaches in science classrooms. As we shift from solely addressing student deficits to transforming campus culture, faculty development of inclusive practices will play an increasing role. In this vein, I am suggesting two main things. First, faculty development on themes of inclusion should focus more squarely on the scope of work instructors need to engage in as they move toward cultural

competency. It should be made clear to faculty that to effectively transform their practice, they should commit to a cultural understanding that is ongoing and permanent. It behooves faculty developers to point out that workshops can only serve to launch participants on a journey of understanding, and that commitment to this journey is mainly up to them. Secondly, greater efforts should be placed on the infusion of inclusive principles in transformed pedagogical training programs, before individuals become postsecondary instructors. This would mean a deep, purposeful transformation of the training STEM graduate students receive to (i) focus more explicitly on pedagogy competency and (ii) to ensure that cultural competence is a major part of that training.

In the long term, inclusive teaching aims for every student in the classroom to have an equal opportunity to leave the classroom having developed particular skills. To ensure that possibility, the classroom environment should be one where the diverse identities of the students are validated and that critical engagement in a broad range of issues, including highly polarizing ones, is not only encouraged but expected. Faculty development on inclusive practices should be backwardly designed from this goal to hone in on the skills instructors need to enable this environment. Such a vision would require instructors to shore up their understandings of the social context around diverse identities (both their own and students) and social barriers that prevent equal opportunities from happening. These are not simple steps to take. The emphasis on ‘journey’ in this essay is deliberate, as the mental and emotional effort required to understand these barriers are great. The structure of most American instructor positions often provide little space for that effort to be fruitfully expended. Faculty development of inclusive practices therefore cannot focus simply on the tools. Developers should also look at a more comprehensive reconfiguration of the academic system to incentivize, promote and even demand a dialoguing approach to pedagogy.

A systemic overhaul will demand that we embrace not only inclusive teaching practices but also take a critical look at the overall practice of teaching. Effective teaching by definition should be structured such that it creates equitable outcomes for all students. In essence, this paradigm shift for inclusive teaching faculty development requires a slight shift in focus from solely promoting best practices to existing faculty to the development of future faculty’s pedagogical skills at the graduate and postdoc level. Some notable efforts are being made in this regard (Allen and Tanner 2006). STEM graduate students and postdocs can now access a sizeable number of robust professional development opportunities focused on pedagogy (e.g. Nadelson et al. 2012). What is unknown is the extent to which those programs currently contain robust treatments of the social context of learning. Simultaneously, developers should consider messaging to faculty more strongly the need to delve deeply into the literature on inclusion. In this way, even if the time demands of current instructors preclude the ability to fully develop competencies in this area, they remain aware of the fact that best practices are only a part of the solution.

Ultimately, faculty development on inclusive teaching should lead us away from inclusive teaching as a term and refocus our efforts on a different model of higher education pedagogy training. Inclusive teaching risks becoming an approach or style, separate and distinct from the craft of teaching itself. I refer to my suggested approach here as ‘deep teaching’. In the same way, we challenge students to develop academic skills that promote ‘deep’ learning for long-term retention (Chin and Brown 2000), our pedagogy should reflect a deep

engagement with the human aspect of the learning experience. Learner-centered pedagogy can only be effective inasmuch as there is a clear understanding of the learner.

As institutions of higher education position themselves to address the issues of URM retention by rethinking their campus and classroom cultures, faculty developers will continue to play an important role in assisting instructors in refining their practice. As potential stewards of progressive approaches to pedagogy, it behooves faculty developers to reflect on approaches to faculty development. The dogged persistence of achievement gaps between URM and white students in the USA suggest that in general, a lot more work needs to be done in the area of equitable STEM pedagogy. The underlying frameworks that currently guide our models further suggest that our current approaches to inclusive teaching training might be somewhat simplistic. The training of existing faculty should be clear on the broad scope of the relationship between inclusion and higher education, and instructors of the future can only be positioned to serve all students if they are steeped in a critical rigorous exposure to an understanding of the society they aim to serve.

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