Faculty Teaching Development: Using the Multidimensional Matrix of Teaching Development to Guide Teaching Improvement Activities

Cheryl A. Murphy[1] and Thomas D. Jensen
University of Arkansas, Fayetteville, AR 72701

Abstract

Higher education faculty learn how to teach through courses, seminars, or workshops during and after their doctoral program. Perhaps the more prevalent way faculty learn to teach is through observational and self-directed learning. In order to assist with self-directed teaching improvements we developed the Multidimensional Matrix of Teaching Development (MMTD) focusing on what dimension or component is being targeted for improvement, how to improve, and who can/should be used to assess the improvement. A facilitator or mentor could also use the MMTD in planning and guiding an individual in improving teaching, and, importantly, student learning. After explaining the MMTD we provide an example that illustrates how the matrix was used by one author as a tool to improve a targeted teaching component.

Keywords: Faculty development, guided, self-directed.

The lack of preparation of faculty in the service and teaching realms, relative to research, has been a concern for decades (Altany, 2011; Centra, 1978; Lewis, 1996; Sorcinelli, Austin, Eddy, & Beach, 2005; Young, 1987). Preparing Future Faculty (PFF) programs as well as teaching centers can be found in higher education institutions across the country, each seeking to assist faculty to succeed in all three areas (DeNeef, 2002; Gaff, 1994; Lang, 2008). However, questions remain as to how to best support faculty, particularly in the area of teaching. Arreola (2007) asserts the need for faculty to become well-versed in teaching as well as content, referring to the teaching role of higher education faculty as a meta-profession: "A profession that assumes content expertise as a foundation but requires professional-level performance in areas outside a faculty member's recognized area of expertise" (p. XIX). Similarly, Young (1987) suggests that, "The key is a closer look at the 'profession' of college teaching- its mixed nature, its multiple features, and its necessary complexity. These are characteristics on which to build programs for faculty professional development." (Young, 1987; p. 14)

In this manuscript we take the position that the teaching role of higher education is a meta-profession; one where higher education faculty have content expertise in some area(s) of their academic discipline. Regardless, however well-prepared faculty are concerning the content of a course, they may lack experience and/or knowledge of the processes of

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[1] Corresponding author's email: cmurphy@uark.edu

teaching and, importantly, student learning. Hence, we elaborate on teaching as a meta-profession and the need for faculty development in teaching as well as in research and service. We also recognize the numerous aspects and complexities associated with the profession of teaching, and that faculty develop at differing rates and times when learning to teach. Subsequently we discuss the multi-faceted nature of teaching and the need for faculty development in teaching to use a targeted but customized approach. We then discuss the processes needed to enhance teaching through faculty development, and ultimately present the Multidimensional Matrix of Teaching Development (MMTD) as a tool that can be used to guide faculty as they work to improve their teaching and, hence, student learning.

Teaching as a Meta-Profession

Teaching has been referred to as a meta-profession for most faculty in higher education (Arreola, Aleamoni, & Theall 2001). Faculty are routinely educated (e.g., classes, seminars, directed study) and trained (e.g., research techniques, statistics, clinical skills) in their "base profession" (e.g., chemistry, English, mathematics, business) but typically not in teaching (e.g., instructional design, delivery, assessment knowledge and skills). Hence, the notion of teaching as a meta-profession. In addition, higher education faculty normally go through various stages or phases in their careers, impacting teaching, research and service. Key elements that can be gleaned from this meta-profession perspective include:

- Faculty "learn" how to teach primarily through their individual experiences, observations, and self-directed learning. Formal courses and short courses/workshops can also stimulate faculty knowledge of teaching/learning, but without practice and feedback teaching performance will not improve. Similarly, mentors can be very helpful but, once again, only if the mentoring occurs with practice and feedback.
- Faculty evolve through various stages related to the phase in their career and/or their perspective on the practice of teaching/learning. At each stage faculty have different teaching developmental needs and may be better served with different methods, content, and mentors in gaining knowledge, practice, and feedback. Hence, those involved with faculty teaching development should plan programs and approaches based upon the stages rather than one "size" fits all.

"Learning" to Teach

There is an inherent assumption in hiring faculty that their content knowledge, practice/clinical skills, research skills, and any teaching experience they have had prepare them for teaching (Arreola, 2007). The research on faculty teaching performance, typically using students' evaluations of teaching performance, suggests that this may not be the case (Aleamoni, 1999, Hattie & Marsh, 1996; Marsh & Hattie, 2002). The notion that content knowledge, although necessary, and experiences with teaching are sufficient to drive good teaching may be misguided and potentially "devalues" teaching (Chism, 2004; Weimer, 1997).

There are typically three ways that individuals, as adult learners, learn how to teach (Post, 2011). First, there are formal credit courses that doctoral students may take. These courses, however, may not be targeted toward teaching college students. Rather, they may be more focused on K-12 teacher credentialing. Second, individuals may learn to teach or improve their teaching through organized short courses, symposiums, colloquiums, or workshops that address a particular teaching technique (e.g., interactive lecture, thinking aloud paired problem solving aka TAPPS), methods for improving and/or evaluating teaching (e.g., teaching portfolio, classroom observation checklist such as COPUS, Smith et al. 2013, or RTOP, Piburn et al. 20000), or use of technology (e.g., Blackboard or classroom response systems, aka clickers) in teaching. Formal credit courses, workshops, etc. can increase teaching knowledge. Regrettably, research has not supported a direct link between teaching knowledge and teaching performance unless the knowledge is directly applied into teaching practice (McAlpine & Weston, 2002; 2004). The third manner in which individuals learn to teach is through observational learning and modeling (Bandura, 1977), or other methods of self-directed learning. This third manner is the predominant manner in which individuals learn how to teach (Hativa 1997; Hativa, Barak, & Simhi 2001; Post, 2011). Individuals utilize their observations and experiences from being students. As college students, undergraduate and graduate, they were exposed to many different faculty teaching in many different ways. In developing their own teaching "style" they borrow from their experiences those things they thought were good or effective based on their enjoyment and learning. As college faculty they then may adapt their approach to teaching in a trial and error fashion based on what was good, what "worked," or what impacted their evaluations (Hativa et al., 2001). Then, based upon feedback from students and/or conversations with other faculty or administrators they might try some alternatives to improve their teaching and, hopefully, student learning.

In general, the consensus is that "University professors, not having received any systematic preparation for their teaching role, gain beliefs and knowledge about good pedagogy through trial-and-error in their work, reflection on student feedback, and by using self-evaluations" (Hativa et al., 2001, p. 700). Overall, collegiate "teaching is a lonely profession . . . [and] once the classroom door is closed . . . you are on your own" (Post, 2011, p. 32). Moreover, at various stages of their career, faculty may view teaching differently and, hence, have different teaching developmental needs (Diaz et al., 2009; Post, 2011).

Teaching Stages

While Diaz et al. (2009) focus on the amount of time faculty have been teaching when discussing levels of teaching expertise, Post's (2011) research suggests that faculty go through various stages of teaching that may or may not relate to the number of years they have been teaching in higher education. Using narratives from twelve college professor participants/informants and a phenomenological approach, Post (2011) identified seven developmental stages of learning to teach in higher education: warming, forming, informing, storming, performing, reforming, and transforming (Figure 1). Individuals may not go through all the stages or at the same rate. Rather, they may settle in a particular stage and stay there or, possibly, regress to an earlier stage.

1. **Warming**	Focus on early educational, social and cultural influences, economic status. Attitudes of parents, teachers and peers encourage development of positive attitudes toward learning and higher education.
2. **Forming**	Focus on graduate school experience and coping with the pressure, isolation, humiliation, accepted "rites of passage." Early trauma (or euphoria) of initial teaching experiences. "New identity" formed in relation to discipline.
3. **Informing**	Focus on first real teaching experiences. Overwhelmed by need to inform and disseminate knowledge with compulsion to share everything in one semester. Overwhelmed by teaching load.
4. **Storming**	Focus on future need to do research while still wrestling with teaching demands. First pangs of assessment angst. Feelings of responsibility toward students.
5. **Performing**	Focus more on student needs. Concerns for "performance" in teaching. Need to maintain own enthusiasm and to increase student interest and attendance. Finding a compatible teaching style.
6. **Reforming**	Focus on trying new teaching techniques and strategies. Burgeoning interest in pedagogy and how students learn.
7. **Transforming**	Focus on finding teaching approach that encapsulates both teaching and learning activities, active involvement of students. Development of identity as the "self that teaches."

Figure 1. Descriptions of Post's Seven Stages of Learning to Teach. Reprinted from "Trial by Hire: The Seven Stages of Learning to Teach in Higher Education," by P. Post, 2011, Contemporary Issues in Education Research, 4(12), p. 32. Copyright 2011 by The Clute Institute.

As suggested by Post (2011), the warming stage is the time when an individual begins to develop an interest in higher education and the possibility of becoming a professor or lecturer, while the forming stage is when individuals begin developing the tools and knowledge necessary for the academy. It is during the forming stage when faculty have initial experiences, positive and negative, with teaching (e.g., teaching assistant, guest lecturer, instructor with full course responsibility). This is also when individuals learn about teaching by watching the teaching behaviors of others. However, it isn't until the informing stage that individuals have the first real teaching responsibility and begin to develop a teaching style, many times basing his or her style upon what has been previously modeled. The storming stage is a period of angst for faculty as they experience the teaching versus research tension, but they return to a teaching focus during the subsequent performing stage when they spend more time and energy on planning their courses and the accompanying activities. This leads to the reforming stage when faculty begin to study how students' learn and make adjustments in their classes accordingly. Both the performing and reforming stages involve a lot of self-directed learning, as faculty attempt

to improve their teaching, and hence, student learning. Lastly, faculty who enter the transforming stage continue to work on improving their teaching, but they also serve as models for others and disseminate knowledge about the teaching/learning dependency (Post, 2011).

As with other areas of academic responsibility (e.g., research, service), it is paramount for higher education faculty to continuously improve their knowledge of teaching/learning, teaching skills, and teaching ability/practice. Professional development in teaching/learning, whether self-directed or facilitated by others, can connect faculty from different disciplines and career/perspective stages in addition to being a central part of the dissemination of knowledge and practice (Altany, 2011).

The Multidimensional Matrix of Teaching Development:
What, How, and Who

As previously stated, faculty tend to learn about teaching through their experiences, observations, and self-directed learning and/or with the help of others whether in workshops, courses or mentoring. At different stages, faculty may have different goals, knowledge, and practical experiences which can guide them in their efforts to improve as teachers. However, in several stages faculty may lack the knowledge necessary to fully understand what and how they can improve. This can lead the utilization of a "shotgun" approach by faculty when making efforts to enhance their teaching performance. In this regard, we propose that if faculty are provided a framework that directs them toward specific areas of teaching they may consider for improvement, they can target these areas and systematically improve as professional teachers. Toward this end, we suggest that there are essential dimensions and components of teaching that can be targeted, and a framework that facilitates such targeting can serve as a useful guide to faculty of all stages.

Creating a common set of dimensions and components should aid faculty, mentors, and instructors with a common nomenclature for targeting and measuring the various aspects of teaching, aspects that can be improved systematically. In the remainder of this paper we present the Multidimensional Matrix of Teaching Development (MMTD). The MMTD is a framework that consists of a set of five dimensions, each containing six components (sub-dimensions). We refer to these dimensions and components as "what" should be considered when faculty target teaching elements for improvement. We follow the introduction of the dimensions and components of the MMTD with a description of "how" performance within these areas may be assessed, and by "whom." We conclude by providing an example of how the MMTD framework was used by a faculty member to improve a targeted teaching behavior.

Dimensions (What)

Teaching is multidimensional (Abrami & d'Apollonia, 1991; Cashin & Downey, 1992; Feldman, 1997; Feldman, 2007; Marsh 2007; Marsh & Roche, 1993). Teaching is not a

single activity but is comprised of content knowledge/expertise plus a set of activities or skills necessary to facilitate and assess student learning. When considering how to deconstruct teaching to identify specific dimensions we first examined the work that has been done in the area of students' evaluations of teaching (SETs). While the teaching constructs identified in SETs are cogent, the focus of SETs is as much on identifying dimensions of teaching that can be effectively assessed by students as on identifying teaching dimensions themselves. Much of the SETs research has been focused on determining what students can accurately judge (e.g., Feldman, 2007; Marsh, 2007; Theall & Feldman, 2007), with less concentration on determining if the judged dimensions of teaching can assist faculty in improving teaching practices. Consequently, to broaden the notion of teaching beyond SETs and utilize dimensions that have been employed during the improvement of teaching practices, our MMTD framework adopts the five broad dimensions of teaching identified by Arreola (2007): *content* knowledge/expertise, instructional *design*, instructional *delivery*, instructional *assessment*, and course *management*.

The first dimension, content knowledge/expertise, is an area that most faculty in higher education are well prepared for through their graduate education, experiences, and ongoing scholarly/professional activities.   Some faculty may, however, be asked to teach in an area in which they are not an expert per se but, rather, one in which they have enough knowledge and/or know where to get the knowledge needed.

Instructional design is the second major dimension. Instructional design entails the planning and sequencing of the elements, events, and experiences students will be exposed to in a course that stimulates learning. The design dimension also involves the creation or discovery of materials (e.g., syllabus, handouts, and videos) and activities, as well as plans for using those materials and activities.

Instructional delivery is the dimension that many, and especially students, interpret as being teaching. The delivery dimension involves the faculty member's communication, both written and oral, with the students individually and collectively. It also entails the creation of a classroom atmosphere in which students interact with each other and with the instructor. It is during the delivery that the instructor can show excitement and enthusiasm for the material or come across as bored and unenthusiastic. As illustrated in the classic Dr. Fox effect study (Ware & Williams, 1975), a person with good presentation and communications skills, with or without content knowledge, can develop an atmosphere that is conducive to learning.

At some point faculty need to assess student learning, which occurs in the instructional assessment dimension. Traditionally this has entailed the use of written exams, multiple choice and/or essay questions, term papers, etc. Alternatively, tests may consist of performance tests of skills learned that are utilized in practice. These tests may be entirely behavioral or be in the form of scenarios with answers being given both orally and in practice situations. Regardless of the assessment, there is an inherent assumption that the assessment is valid and reliable; that is, that it is measuring learning/performance and could be replicated in another situation for another faculty member, etc.

The final dimension, course management, involves all the activities necessary to make the class as smooth and seamless as possible. Course management entails having the right equipment available; arranging field trips; securing and scheduling guest lecturers; timely administration and grading of homework, exams, and papers; flexibility in making changes that may be necessary; starting and ending a class session on time; being available for students outside the classroom for clarifying course content and practices; and a variety of other tasks necessary for the operation of the course.

Components (What)

The five broad dimensions of teaching (Arreola, 2007), *content* knowledge/expertise, instructional *design*, instructional *delivery*, instructional *assessment*, and course *management*, although very beneficial, do not provide enough specificity to guide faculty as they seek to improve aspects of their teaching. Hence, it was necessary to identify sub-dimensions or components of each teaching dimension within the MMTD framework. As with the dimensions, it was desirable to go beyond dimensions/sub-dimensions of SETs. Thus, the components identified by Hildebrand, Wilson, & Dienst (1971) were adapted for use in the MMTD framework. For each of the five dimensions, six different components were identified. The five dimensions and six components in the MMTD are described in Figure 2.

Although there are six components per dimension, there is some redundancy. For example, "appropriateness" appears for content (i.e., appropriate content), instructional design (appropriate methods), and twice for instructional assessment (i.e., appropriate methods, appropriate level). Clarity, another component, falls under instructional design (i.e., clarity of goals or objectives), delivery (i.e., clarity of delivery), and assessment (i.e., clarity of criteria) as well as under course management (i.e., clarity of management). Other components are unique to a particular dimension (e.g., curricular alignment in content, sequence in instructional design).

Additionally, the components are not meant to be exhaustive. Rather, there may be many other components that are specific to a dimension (e.g., use of technology in instructional design and/or delivery) or that cut across dimensions (e.g., organization). However, those that are included offer faculty a solid starting point or framework and allow each faculty member to further define the component in relation to his/her teaching context as he or she works toward the self-directed improvement of teaching.

Assessing Performance (How & Who)

The teaching dimensions and components are the cornerstone of the framework and assist faculty in determining *what* aspect of their teaching they want to improve. The next step would naturally be to determine the steps and processes they would go through to improve that aspect. Those steps and processes vary based upon context, the particular component, and the experience/knowledge of the faculty member. The faculty member might want to seek the assistance of a colleague, mentor, or, when available, an on-

campus teaching center and its staff and resources. Part of the process would entail *how* to measure performance and *who* would have the ability to judge the performance.

Adding the *how* and *who* (Figure 3) to the *what* (dimensions and components) completes the Multidimensional Matrix of Teaching Development framework and encourages self-directed faculty to gather the feedback needed to successfully inform their teaching development. As can be seen in Figure 3, one needs to determine *who* can and should evaluate teaching performance on any dimension and component, and the method that should be used, or the *how*. Faculty using the MMTD framework are guided to consider who is capable of evaluating the various aspects of teaching by marking Y or N (yes or no) under each potential *who* relative to the specific dimensions and components. Once they identify who is capable of evaluating them in specific areas, the framework also prompts them to identify the method(s) that will be used during this evaluation. This can broaden a faculty member's perspective to the processes of obtaining the feedback they need relative to instructional adjustments they may make. It also encourages faculty to gather multiple forms of data and resources that can be used not only to inform future teaching practice, but that may also be included in yearly faculty evaluations.

As an example of how the prompts within the MMTD framework can be helpful, when considering who should evaluate their teaching, most faculty default to or rely solely upon students and the student evaluation system (SETs). However, for some dimensions and/or components (e.g., currency of content), students and SETs questions may not be appropriate to provide the feedback needed by the faculty member. In these situations peers/colleagues, a department chair/head, a mentor, or maybe even an outside source may be in a better position to judge the effectiveness of that teaching component. Thus, the MMTD framework encourages faculty to be more deliberate and thoughtful when considering who and how to evaluate their attempts to improve teaching and learning. A ready-to-use blank version of the full MMTD may be found in Figure 4, and the example that follows offers an illustration of how faculty may utilize the Multidimensional Matrix of Teaching Development.

Example

One of the current authors was teaching a junior/senior class with approximately 135 students. Most of the students were required to take the course either for their major or minor. After consulting the MMTD framework, one targeted teaching goal identified by this author was to make the class content more relevant to the students (dimension = content, component = relevancy). Once the dimension and component were selected, relevancy had to be more precisely defined to make this targeted component specific to the context of the course. In this situation, relevancy was defined as being contemporary (e.g., up-to-date examples), in line with subsequent coursework, and allowing students to relate course content to their current lives as well as see the usefulness in the future professional work. To this end, the current author planned numerous teaching and content modifications for the course with the specific aim of improving relevancy.

Dimensions	Components	Description
Content	currency	Content is current and up-to-date
	relevance	Content is relevant to students
	accuracy	Content is accurate within the discipline
	appropriateness	Content is appropriate for the course and student level
	thoroughness	Content is thorough in its coverage of key concepts
	curricular alignment	Content is aligned with other courses in the curriculum
Instructional Design	clarity of goals	Goals are clear and pursued within the design of the course
	interactivity	Interactivity is included within the design of the course
	attractiveness	The design of the course and/or materials is attractive
	sequence	The topics of the course are designed to follow a logical sequence
	appropriate methods	Appropriate instructional methods are chosen and used
	worthwhile activities	Meaningful activities are designed and utilized
Instructional Delivery	suitable	The instructional delivery is suitable for students and the content
	functional	Delivery methods function and work well in the class location
	attractive	Content is delivered in an attractive format
	accessible	Learners can easily access instructional content and materials
	clarity	Content is delivered in a clear and understandable manner
	accommodating	Delivery of content accommodates all learners
Instructional Assessment	appropriate method	Appropriate instructional assessments are chosen and used
	alignment with goals	Assessments align with course and lesson goals and objectives
	clarity of criteria	Clear instructions and criteria are provided for all assessments
	appropriate level	Assessments target appropriate levels of learning
	reasonable	Assessments are reasonable given content, course, and learner constraints
	feedback	Assessments provide feedback to learners and the instructor
Course Management	responsive	Instructor is responsive to course and student needs
	accessible	Instructor is accessible to students in and outside of class
	rapport	Instructor builds rapport with students
	timely	Instructor is prompt and timely in providing information to students
	clarity	Instructor provides clear direction, guidance, and policies
	respect	Instructor demonstrates respect to students and earns student respect

Figure 2. Dimensions and components of the Multidimensional Matrix of Teaching Development. This figure also includes a brief description for each dimension and component.

Dimen-sions	Compo-nents	Students		Peers		Dept. Chair		Mentor		Self		Other	
		Y/N	Meth od	Y/N	Meth od	Y/N	Meth od	Y/N	Meth od	Y/N	Meth od	Y/N	Meth od
Content	currency												
	relevance												
	accuracy												
	appropri-ateness												
	thorough-ness												
	curricular alignment												

Figure 3. Performance Assessment within the Multidimensional Matrix of Teaching Development. This figure demonstrates the addition of *who* (students, peers, etc.) and *how* (method) for the evaluation of the Content dimensions and its components.

The MMTD framework then prompted this author to determine who could judge the relevancy of the material (as defined above) and how it was presented. This author determined that several potential evaluators listed in the matrix could judge the relevancy including students, peers, self, and a content-focused advisory board (Figure 5). Since a key goal was for students' to see the relevance, they were selected as the main evaluators. However, it was recognized that in order to be effective evaluators, students would have to attend class to judge the relevance of the material. Also, it was recognized that the advisory board would be qualified to discuss career relevance, while peers could judge relevancy related to other coursework and current events. Conversely, these last two groups were considered to be limited in their abilities to judge relevance to students.

Once this author determined who could evaluate the various aspects of the relevancy component, the manner of evaluation for each "Yes" group was considered. Based on the desire to use all students within the course as evaluators, three items were added to the end of the semester students' evaluations of the teacher/course (SETs). These items, as well as all the other items on the evaluation, were also asked of the students during a midcourse evaluation. The three items included:

- My instructor attempts to relate my present learning to work in my future profession;
- My instructor incorporates current developments in the field; and
- My instructor makes course material relevant to me.

Rather than rely only on the midterm or end-of-semester evaluations, and to account for the need of students to attend class in order to evaluate relevancy, daily feedback was also solicited from a "panel" of students. For the panel, students were randomly assigned to class dates such that there were 4-6 panel students in any given class. Students were not required to serve on the panel and provide the instructor with feedback. However, if they did participate they received extra credit points. For the panel students were asked

Multidimensional Matrix of Teaching Development (MMTD)

Dimensions	Components	Students Y/N	Method	Peers Y/N	Method	Dept. Chair Y/N	Method	Mentor Y/N	Method	Self Y/N	Method	Other Y/N	Method
Content	currency												
	relevance												
	accuracy												
	appropriateness												
	thoroughness												
	curricular alignment												
Instructional Design	clarity of goals												
	interactivity												
	attractiveness												
	sequence												
	appropriate methods												
	worthwhile activities												
Instructional Delivery	suitable												
	functional												
	attractive												
	accessible												
	clarity												
	accomodating												
Instructional Assessment	appropriate method												
	alignment with goals												
	clarity of criteria												
	appropriate level												
	reasonable												
	feedback												
Course Management	responsive												
	accessible												
	rapport												
	timely												
	clarity												
	respect												

Figure 4. The full Multidimensional Matrix of Teaching Development. This figure offers a full view of the MMTD that may be used by faculty or faculty developers.[2]

Dimension	Component	Students Y/N	Methods	Peers Y/N	Method	Dept. Chair Y/N	Method	Mentor Y/N	Method	Self Y/N	Method	Other Y/N	Method
CONTENT	RELEVANCE current events, career, other classes	Yes	Midterm & End of Semester Evaluations Items (52) my instructor makes course material relevant to me) and (61) this courses relates course materials to real life situations. Daily/Weekly - ask for feedback from class panel for feedback about relevancy to: current events, career, role as consumer, other classes, etc.	Yes	Relevancy to current events, etc.: Copies of news clips, newspaper and video, used in class. Relevancy to other courses: Copy of syllabi and course materials Discussions with other peers about the material needed for their subsequent courses.	N		N		Yes	Log of dates of materials(articles, videos, etc.) used Perception of relevancy to other courses (e.g., link to other syllabi).	Yes	Advisory board discussion and feedback about relevancy for career.

Figure 5. Example of author's use of the MMTD to improve content relevance.

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[2] See http://www.uncw.edu/jet/articles/Vol16_2/Murphy.html for details in Figures 4 and 5.

to answer questions about the relevance of that particular class session's content to their lives, current events, other classes, etc. They completed these evaluations independently and emailed them to this author within 24 hours. The two methods that were chosen to gain student evaluations of relevancy provided both daily and long-term feedback to this author.

In addition to the use of student evaluations, the methods chosen for peer evaluations included one-on-one discussions with other faculty members and a request for a peer to examine the syllabus and course materials (news clips, videos, etc. used in class) to determine thoughts about the relevancy of the course. During the discussions other faculty were asked about the materials needed for subsequent courses, and thoughts about the current events that should be included within the course. The data gathered from peers provided this author with feedback from the view of fellow teachers, which differed from the feedback received from students.

A third source of data came from the advisory board. During a meeting this author asked the advisory board to weigh in on their perceptions regarding the things most relevant to student career expectations and success. As with student and peer data, this feedback was very helpful in the external evaluation of the teaching updates that were made to increase relevancy within the course.

Lastly, this author performed an internal (i.e., self) evaluation of the relevancy component. Self-reflection techniques included the logging of new materials and methods, observations of how these were received by students, and perceived relevance of the updates to other courses within the academic program. These data were useful in rounding out the overall evaluation of the instructional improvements that were made to increase the relevancy component of the content dimension of teaching.

By following the MMTD framework, this author was able to identify and target a teaching component for improvement, and determine an evaluation strategy to assess the teaching updates that were made regarding the targeted teaching behavior. The MMTD provided structured guidance that prompted this author to consider dimensions, components, evaluators, and evaluation methods. However, it was also flexible enough that it allowed the user to determine the appropriate context and depth of the instructional intervention, subsequently meeting this author's teaching development needs.

Limitation

Although the aforementioned example provides an illustration of how one of the current authors was guided through a teaching improvement process by the MMTD, this exercise also helped us recognize that a key faculty element is necessary to the successful use of this tool. Faculty members who utilize the MMTD must have the motivation (internal or external) to improve their teaching practices. The author discussed in the example above was self-motivated to improve teaching practices, which provided a strong impetus to go through each of the steps and utilize the tool as intended. However, without the internal motivation to improve, other faculty members may not be willing to exert the energy and effort necessary to implement the tool and improve teaching practices. Similarly, if the

motivation for using the MMTD is external (i.e. faculty are told they must improve their teaching), faculty may not have the personal drive to implement all steps within the MMTD, which could short-cut the process and thereby diminish some of the inherent benefits afforded by this tool. This has led us to suggest that, in cases where faculty lack internal motivation to improve upon their teaching, it may be necessary for a mentor or member of a teaching support center to assist faculty in the appropriate and full imple-mentation of the MMTD tool.

Conclusion

As Arreola (2007) asserts, we must not assume that faculty come to universities as sea-soned teaching professionals. Rather, most faculty are not prepared within their doctoral studies for their roles as teachers and must work once they become faculty to evolve into experts in this area (Altany, 2011). Post (2011) suggests faculty evolve through various developmental stages of teaching, and the primary methods by which faculty learn and grow as teachers are through self-directed learning, observation, and feedback. In other words, faculty often learn about and improve their teaching through trial and error which often involves observations, experiences, and feedback. In some cases this trial and error may involve a "shotgun" approach, which is untargeted and often not evaluated for effec-tiveness.

To provide faculty with a framework they can use to identify and target key teaching di-mensions, the Multidimensional Matrix of Teaching Development has been developed. The structured MMTD framework gives faculty in all stages the ability to identify and target a specific component of teaching, and to create a plan to improve and assess that component through experience and feedback. The MMTD helps faculty think about the areas in which they can potentially improve and lets them bring their own context to the best practices of teaching and learning while developing their teaching using evidence based teaching practices.

In using the MMTD framework, the evaluation aspect prompts faculty to examine who is qualified to evaluate specific aspects of teaching and encourages them to connect with others, including peers and mentors, for specific feedback concerning teaching improve-ments. The MMTD framework also encourages even the most novice of faculty to par-ticipate in SoTL (scholarship of teaching and learning) activities by providing a structure the faculty member can use to plan and evaluate targeted teaching interventions. This can lead to the provision of specific evidences associated with teaching improvement that can be used by faculty in yearly evaluations and promotion and tenure documentation.

To conclude, the use of the MMTD framework gives faculty of all stages structured guid-ance in identifying and targeting specific teaching behaviors. It also prompts them to test these interventions, and assess the effectiveness of the interventions via multiple forms of feedback.

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