

Practice and Perception: A Qualitative Study Exploring the Effects of a Professional Development Workshop for College Astronomy Faculty*

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Abstract

While faculty development resources abound, STEM-specific faculty development efforts are quite limited. The purpose of this qualitative study was to explore and describe the influence of one such effort, a 2-day learner-centered professional development workshop for two- and four-year college astronomy faculty. In particular, faculty conceptions of teaching and teaching practice, the conceptions of their students, as well as the teaching conceptions of the faculty developers were examined. Data sources include open-ended, pre- and post-workshop questionnaires from over 200 astronomy faculty, teaching observations and interviews with five selected faculty, interviews with the three faculty developers, as well as Likert and open-ended surveys from over 300 introductory astronomy students. Results document the individual goals of faculty as they participated in the workshop, the complexity of their teaching conceptions and practices, the range of student interpretations of the teaching that goes on in their classrooms, as well as documenting a change in teaching beliefs of the faculty developers from year to year. This study reveals that a common faculty development workshop experience has many and varied outcomes that are highly individualized to the faculty who participate, that one success of this particular faculty development program was its discipline-specificity, and that student reactions to the enacted workshop teaching techniques were also highly varied.

Research Question

How do two- and four-year college astronomy instructors incorporate the pedagogical tools from a faculty development workshop into their "native" teaching beliefs and practices?

Methodology

This study utilizes a qualitative, case study design (Creswell, 1998, 2003). Participants include:

- 122 two- and four-year college astronomy instructors
- The three faculty developers
- Five faculty "heavy adopters" of the workshop teaching strategies
- 316 introductory astronomy students enrolled in the "heavy adopters" courses

Data sources include:

- Open-ended pre- & post-workshop faculty surveys
- Fixed & open-ended post-workshop online surveys
- Faculty developer interviews
- Workshop observations
- Faculty interviews
- Classroom observations
- Likert & open-ended student surveys

Open-ended faculty survey questions and faculty developer interviews were analyzed using the constant comparative method (Glaser & Strauss, 1967), clustering and counting (Miles & Huberman, 1994), and connection circle visualization (Quaden & Ticotsky, 2005).

Table 1.

Pre- and post-workshop teaching strategies that best promote student learning with explanations

Pre-workshop Teaching Strategy	Explanation	Post-workshop Teaching Strategy	Explanation
In-class activities that help them learn (not busy-work exercises)	Has them directly learn the material by making their own discoveries, rather than just memorizing info	Lecture-Tutorial [Workshop strategy]	Gives students focused activities that promote their comprehension and extend their understanding
Out of class assignments which have them apply their knowledge to new situations	Forces them to really understand the material by extending their knowledge to a new situation.	Think-Pair-Share [Workshop strategy]	Encourages interaction and debate.
Group discussion	Helps them realize what they know and they can teach that info to someone else (& we all know the way to really learn a subject is to teach it)	Clickers [Workshop strategy]	Good way to get immediate feedback and check attendance

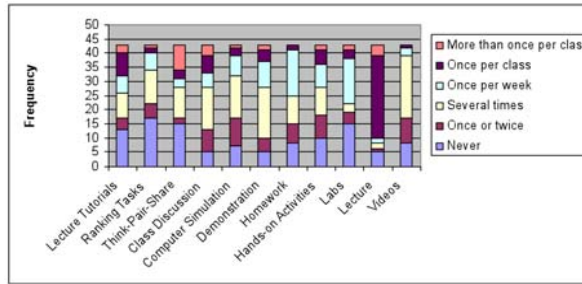


Figure 1. Reported frequency of use of teaching strategies by Astro 101 instructors (n=43)

Table 2.

Reported barrier clusters, sample quotations, and frequencies (N=122)

Barrier	Representative Quotations	Frequency
Curriculum and Instruction	"Assuming that the students have purchased the tutorial book, the biggest problem seems to me to be classroom management, and following through with the right kind of assessment." "Designing effective lectures to get students ready for [Lecture-Tutorials]"	38
Logistics	"Cost" "The ability to write good questions"	25
Time	"Getting a balance between lecture & tutorials in terms of time." "Finding the time to do it AND be able to cover everything that I still want to."	23
Personal	"My inexperience with the strategy" "It takes time & energy to change." "Probably me. I am not always the best to work in groups myself"	20
Student Response	"Student resistance to any collaborative activity" "Non-participation"	18
No Reported Barrier	"None"	14

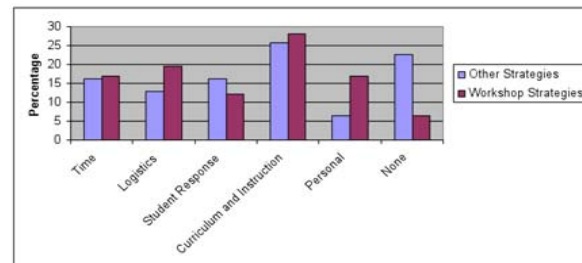


Figure 2. Comparison of self-reported barriers to implementing workshop & other teaching strategies (n=122)

Preliminary Results and Conclusions

Reported Teaching Conceptions

Immediately prior to and following the workshop, faculty were asked to provide three instructional strategies that promote students' learning and explain how these strategies did so.

Following the workshop, faculty more frequently reported workshop teaching strategies as those that promoted student learning. The explanations for these strategies tended to be more simple, brief, and vague, but also related to pre-workshop responses. (Table 1)

➤ **Faculty may have changed their beliefs regarding the teaching strategies that best promote students' learning, and made sense of these new strategies in terms of their "native" beliefs.**

Reported Teaching Practice

Between six and eighteen months after attending the workshop, faculty were asked to complete an online survey about their use of workshop teaching strategies. Approximately two-thirds of respondents reported using workshop teaching strategies (Lecture Tutorials, Think-Pair-Share, and Ranking Tasks) at least once in their current introductory astronomy classes. About one-third reported using these at least once per week. (Table 2)

➤ **Faculty reported incorporation of workshop teaching strategies into their teaching practice following participation.**

Reported Barriers to Change

Following the workshop, faculty were asked to select one of their reported post-workshop teaching strategies (Table 1) and report any obstacles to implementing that strategy. Most faculty reported one of the active learning strategies taught in the workshop. These six themes emerged, which are generally consistent with previous literature on reported barriers to change (e.g. Sunal, Sunal, Whitaker, Freeman, Odell, Hodges, Edwards, & Johnston, 2001; Henderson & Dancy, 2007). As seen in Table 2, over 75% of the barriers reported were *external* (e.g. time, logistical) rather than *internal* (e.g. personal).

The distribution of types of barriers to implementation for both workshop and other (i.e. "native") teaching strategies were reported by faculty. As seen in Figure 2, the distributions are quite similar, except where it came to logistical, personal, or no barriers. Workshop teaching strategies elicited more logistical and personal barriers for respondents, while "native" teaching strategies were much more likely to elicit no barriers.

➤ **Faculty reported similar barriers to change as are seen in the literature. New teaching strategies elicited a greater incidence of perceived personal and logistical barriers than "native" strategies.**

*Note: This poster describes preliminary results. This study is ongoing.