
AC 2011-8: MENTORING WITH INDEX CARDS: AN EARLY INTRODUCTION TO FORMATIVE ASSESSMENT FOR NEW FACULTY

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Mentoring with Index Cards: an Early Introduction to Formative Assessment for New Faculty

Abstract

This paper illustrates the experiences of three first-year faculty members as they acclimated to their new educational environment through an unusual mentoring process involving the humble 3-by-5 index card. The faculty members were instructed in how to utilize index cards for soliciting comments from their students. The cards were then used for formative assessment in effecting changes in course content through both instructor reflection and discussions with a senior faculty member. The index cards served as an effective framework for developing a mentoring relationship, with the senior faculty member providing experiential input to assist the new faculty members evolve their teaching styles and course content to better meet the needs of their students.

Introduction

As educators, one of our goals is to provide a positive and effective learning experience for our students. To assist in this effort, many institutions utilize student course evaluations at the end of the term featuring both quantitative and qualitative questions, thereby providing summative assessment feedback to the instructor. Unfortunately, such feedback comes too late to effect course changes for the cohort providing the constructive criticism. An additional hazard is that items concerning an instructor's teaching methodology that could be easily corrected are not mentioned by students until this evaluation is conducted, potentially resulting in lower evaluation scores. For beginning faculty members, such scores can have a negative impact upon the tenure process. In the pursuit of becoming an effective instructor, it is essential to employ a feedback mechanism that provides for formative assessment, thereby allowing adjustments to be made for the benefit of both the course instructor and the cohort furnishing the input. Additionally, new faculty members can greatly benefit from the accumulated wisdom of the senior faculty; accordingly, the establishment of mentoring relationships can be invaluable in getting the new hire "up to speed" with the specific student cultural norms at that institution, along with providing basic tips and advice for teaching improvements. However, it is not enough to have a dean or a department chair simply designate that "Professor Foo" is ordained to be the mentor of "Assistant Professor Bar"; there needs to be an appropriate foundation upon which the mentoring process can be established.

The use of index cards in the classroom to solicit student comments about the instructor and/or course is a simple, easily implemented formative assessment technique. The review of such cards between new hire and mentor is non-threatening in that the mentor is not directly passing

judgment upon the performance of the new faculty member but is instead assisting in the consideration of the students' input, using his or her accumulated wisdom and experience to help in the formulation of a response. The operation of this mentoring approach is as follows. At key points during the term (for example, prior to an exam), an index card is distributed to each student at the beginning of class. The students are requested to anonymously use the cards to indicate how things are going with the course, then turn in the cards as they leave. Specifically, students are asked to fill the card out with information such as their concerns about the course, what questions they have that have not yet been answered, what concepts they are having difficulty with, their likes and/or dislikes about the course – essentially, any items of information that they feel like providing the instructor so that there is feedback that can be acted upon regarding what is, and what is not, working in the course. The instructor reviews and reflects upon the received comments, then meets with his or her mentor, who both reviews the index cards and discusses what modifications can be made to effect improvements.

In the 2009-2010 academic year, there were three professors who were new both to the profession and to the Electrical & Computer Engineering and Computer Science Department at Ohio Northern University (ONU): Dr. Nathaniel Bird, Dr. Firas Hassan, and Dr. Yonglian Wang. For a small program having just a total of ten full-time faculty, this amounted to a sizeable change in the faculty make-up; it also presented an opportunity to simultaneously examine the effectiveness of the formative assessment technique described in this paper with multiple “freshly-minted” PhDs while mentoring them through their first year of teaching. To start the process, each of the three aforementioned faculty members was sent the following email message from Dr. John K. Estell, the senior faculty member who served as mentor to all three of the newly-hired assistant professors:

I've placed a set of index cards in each of your mailboxes that I would like for you to use to request anonymous feedback from your students in all of your classes. This is an effective technique to determine how things are going in a course, as it allows students to tell you what their concerns are, their likes and dislikes about the course, etc. The way I use this in my courses is that I distribute the cards at the beginning of the class, and tell them that I'm requesting anonymous feedback from them as to how things are going in the course. I specifically ask them to let me know what unanswered questions do they have, what concepts are they having problems with, what they like and/or dislike about the course – essentially, anything they can tell me so that I know, as the instructor, what is working, what is not working, and what items need further review. The students have the class period to write down their comments while you're lecturing, and they turn the cards in at the end of class.

Please perform this exercise no later than the end of the fourth week in all of your classes. Please review your responses, then make an appointment to see me so that I can review the cards with you and, if necessary, discuss ways that improvements can be made based on the students' input. In this way I can effectively work with you to help you become both a better instructor and more in tune with the expectations of a typical ONU engineering student. If you have any questions please feel free to stop by my office.

Figure 1. Body of email sent by mentor explaining index card assessment process.

While the use of such an approach to formative assessment in the classroom is hardly new (this is essentially the “Minute Paper” assessment approach popularized by Angelo and Cross¹) to those who have been teaching, one has to take into consideration the amount of preparation that the typical graduate student receives in anticipation of an academic career – which is none whatsoever. They have little, if any, background in any pedagogical approaches or with lecturing experience; many are close to the point of being overwhelmed with the work involved with creating multiple new course preparations in their first year. The consideration of adding a feedback loop to the process is generally not on their minds, so the intervention of a senior faculty member in a mentoring fashion is critical for starting this process, and in these three specific cases the intervention was well-received by the faculty, as evidenced by one of the faculty members reacting with the comment, “What a great idea!” To a first-time instructor this approach is new and is seen as an easy and non-threatening way to obtain formative assessment feedback prior to the summative course evaluation survey distributed at the end of the term. The use of index cards thereby allows for improvements to occur before the official “bean counting” process occurs, which permits the beginning faculty member to make corrections and thereby potentially achieve higher evaluations as a result, or at least correct and thereby avoid a lower evaluation in a particular category.

The Assessment Process

The assessment process is pretty straight-forward: the faculty member determines what information he or she is most interested in collecting, then at the beginning of class an announcement is made and an index card is distributed to each student. An example of such an announcement is the following that Dr. Bird used in his classes:

- ▶ Please *anonymously* fill out the index card distributed to the class with information you wish the instructor to know. Consider the following questions:
 - Are there any problematic concepts for you?
 - Is there a topic you wish we had covered?
 - Are there aspects of the course that help you learn?
 - Are there aspects that hinder your learning?
 - Is there anything else I should know?
- ▶ Upper left: course, date. (Not your name!)
- ▶ Thank you!

Figure 2. Specific instructions and feedback requests made by Dr. Bird.

The students are given the entire class period to contemplate and anonymously record their responses. The lead author has used this technique for many years and has never found it to be disruptive to the learning experience within that class; most responses are relatively short and are completed while the instructor is still within the introductory phase of that day’s lecture. Students drop off the cards while leaving at the end of class, after which the instructor then collects and processes. Figure 3 provides a random assortment of index cards containing comments received from students in Dr. Bird’s Data Structures and Algorithms course.

Overall, great class. Information is presented clearly. Micro-quizzes help reinforce material.

I would have liked a few more examples with the sorting algorithms we did prior to heaps. Merge sort was somewhat difficult to grasp from examples.

I would also liked to have seen more examples for loop invariants early on. I get it now, but was still hazy on it for the first exam.

Data Structures
Feb 4

Too much time is spent just copying what is in the book on to the board. It seems like there could be a more important/interesting use of class time. Covering the material is good, but perhaps more ^{good} examples and less copying would be better.

Data Structures I 2/4/2010

- Problematic concepts: loop invariants.
- aspects that hinder: a lot of material is just the book written in the board. Have a hard time learning from a book.

DATA Structures I

- Loop Invariants → know what they are, but not sure how to form our own.
- Homework + exercises in class are helpful to see exactly how some algorithms work, step by step.

Figure 3. Sample of submitted index cards from Dr. Bird's Data Structures and Algorithms course.

The Evaluation Process

The best way for evaluating this type of student feedback is to categorize the responses into three primary areas: what is perceived to be working, what is perceived to not be working, and what topics students feel weak in. Within each category, multiple instances of responses are looked for to help determine if there is strong agreement amongst the students regarding particular points. Figure 4 presents such a categorization for feedback obtained by Dr. Bird in his Data Structures and Algorithms course; numbers within parentheses indicate multiple responses. One of the benefits of the use of index cards is that, via such a low-tech method, it is easy for the instructor to take the individual responses and sort them into whatever piles are desired as soon as the class is over. This differs from web-based survey instruments that first need to be constructed, then disseminated, after which the instructor has to wait for students to receive notification, then hopefully get online to fill out the form.

| | |
|---|--|
| <p><u>Good</u> Information presented clearly (5) Microquizzes help me learn (3) Homework assignments help me learn Professor knows the subject very well Professor is energetic Professor is helpful outside of class Programming assignments help me learn Like professor's teaching style Course going well</p> | <p><u>Bad</u> Lecture just follows the book (3) Would prefer individual UNIX machines with a GUI interface for programming assignments Want 5 days of classwork instead of 1 lab per week "Spice up" the class material Present material not in the book Need more sorting examples Need more specific pointer examples Do not like grading each other's microquizzes Professor's writing on board is small sometimes Want application oriented programming assignments UNIX and C were very difficult to pick up originally, but fine now Lab implementation is sometimes difficult Other students waste class time with irrelevant questions Classroom discipline lacking</p> |
| <p><u>Problem Topics</u> Issues with loop invariants (6) Issues with Merge sort Loop invariants were difficult early on</p> | |

Figure 4. Evaluation of index card comments from Dr. Bird's Data Structures and Algorithms course.

The Mentoring Process

Each of the new faculty members was asked to perform the index card exercise in all of their classes during the fourth week of their first term of teaching. Following their review of the received index card responses, the faculty members individually scheduled a meeting with their mentor to review, discuss and reflect upon their students' comments. The effect of this approach was to construct a less formal setting – in that no official review was being conducted – in order to focus on helping these faculty members become better instructors and to be more “in tune” with the idiosyncrasies of their students (to give one example of such an idiosyncrasy, the lead author once worked at an institution where students expected the use of PowerPoint, which is definitely not the case for ONU engineering students). The review session required only about 15 minutes, but it allowed the mentor to review the cards received, listen to and comment upon the instructor's reflections, and provide both insight into student expectations and suggestion for improvements. An example of the results of such a review is presented in Figure 5, which consists of the notes recorded by the mentoring professor following his first meeting with Dr. Wang to review her index cards.

In order to further promote both course and instructor improvements, the new faculty members were asked to again perform the index card formative assessment exercise during the eighth week of their first term. By incorporating a second round to the process, it allowed both instructor and mentor to determine the effectiveness of the changes made as a result of the first formative assessment.

Dr. Wang - 1 October 2009 Discussion:

- Will discontinue use of PowerPoint slides and instead use whiteboard. This will also take up less prep time.
- Will work on going slower in lecture.
- Will develop her own examples instead of using the ones in the book.
- Had good discussion. Positive outlook on trying to improve instruction and on working to meet student needs.

Figure 5. Notes by mentor summarizing results of index card review meeting.

After the end of their first term of teaching, each new faculty member was asked, as a follow-up to the two sets of index cards distributed to each class and the subsequent official course evaluations conducted by the students, to write a short reflective piece about their experiences in using the index cards as a technique for beginning instructors to solicit comments from their students regarding their teaching. They were specifically asked to reflect upon what ways were the student comments helpful and how the process helped them make modifications to either their teaching style and/or the materials presented to their classes. The following sections provide the reflective comments from Dr. Bird, Dr. Hassan, and Dr. Wang, respectively.

Dr. Nathaniel Bird:

The index card method was extremely useful to me as a first-year instructor. Getting feedback from the students before the end-of-term online course evaluation was tremendously beneficial. In some cases, the index card feedback merely reinforced what I already knew, such as topics students had trouble with. However, in other cases, I was made aware of problems I would not otherwise have known about. The issue I remember most acutely was that my writing on the board was too small for some students to comfortably read. This issue was minor and easily fixed, but I would not have known about until it was too late if I had waited for the end-of-term evaluation, and some of my students would have suffered in the meantime.

I found the mentoring helpful in identifying what student suggestions were addressable and which were not. University teaching involves a lot of time spent planning for classes alone. The mentoring helped to break me out of this vacuum and solicit and receive constructive feedback from a seasoned professional based on actual student concerns. As someone new to the profession this was appreciated, especially as not everything can or should be changed based on what students write on the cards.

When presenting the index card procedure to my classes, I solicit feedback specifically on what helps and what hinders their learning, and not just what they do or do not like. I have found that some mechanisms that I use in my course are not liked *per se*, but are acknowledged to help overall learning.

I have since used the index card method in all of the courses I teach to get feedback from my students. I solicit feedback twice per term. There are not many small problems to address anymore, but I find it good to be able to address course concerns, even if it is just to say that a classroom policy that is viewed negatively by some is actually good in my mind. Directly addressing student concerns seems to help the students feel respected, which makes them more open to the class and the work required of them.

Dr. Firas Hassan:

I used the index cards to understand where my teaching style disagrees with the students' expectations. The main three points commented upon were related to the use of PowerPoint slides, in-class examples, and homework material.

Students disliked the fact that my PowerPoint slides were lengthy in size and often contained detailed material from the book. They wanted the slides to be shorter, summarizing the material in the book and highlighting the main points. Also, they asked me to post the slides before the lecture so that they can write their own interpretation on the handouts while I am explaining. The reasoning for my approach was that I wanted the students to use the slides as notes and study from them. Also, I was not posting my slides before the lecture because I wanted the students to focus with me on the board directly.

I used to work examples in class that are in the book so that students won't worry about writing the example but instead concentrate on understanding the concepts. However, students wanted me to solve some examples from the problem session which are similar to the homework problem. They didn't like the idea of solving the examples of the book because they thought that they are available for them to access at any time.

My homework assignments at the beginning were slightly difficult. I wanted the students to think about the problem before we solve it in class. However, students noticed that the problems they were solving in the homework assignment are much more difficult than the examples I used to give in class. As a consequence, they used to spend long time on solving homework. Also, they asked me to solve the homework in class after I collected it while the material and their thinking process are still fresh in their mind.

After the feedback, I told the students that I would adopt their ideas in all three points and modified my teaching style accordingly. As a result, I was able to provide the class outcomes without problems. Also, the students really appreciated the fact that I have adapted my teaching style to their needs.

Dr. Yonglian Wang:

Fall 2009 was my first term as a professor. Using index cards helped me in three ways: to find out how the students want this course to be taught, to adjust my teaching style according to their likes and dislikes, and to understand the educational backgrounds of the students in my courses. For my Microprocessors course, there were 36 students from three programs. It is difficult to teach students with different backgrounds in hardware concepts and programming skills. At the beginning of the term, I adopted my previous teaching style, using PowerPoint slides to cover all the stuff for one lecture and assigning the homework based on what had been covered. But the index cards indicated that the students want the class to be taught using board writing instead of PowerPoint slides, going more slowly in each lecture, and giving more examples associated with the homework assignments. I also focused on the positive suggestions which students pointed out to help improve the lecture. For example, I started using either a signup sheet or a class quiz for attendance instead of calling roll in class, which saved lecture time, because of a comment card suggestion. The index cards gave me a better picture of my students' background in assembly language programming, which plays a very important role in learning the structures and characteristics of microprocessors. I found out that many students had encountered difficulty in assembly programming, so I tried my best to spend more time to explain how various instructions were combined to implement specific functions

Conclusions

Many of the experienced educators who read this paper will no doubt agree that the use of index cards for formative assessment in the classroom is a useful practice, but hardly an innovative one. However, to those new to the profession, such as the three junior faculty members co-authoring this paper, it is a new concept that can help improve their classroom teaching. By incorporating a review of student feedback with a senior faculty member, this approach also provides an opportunity to effectively mentor junior faculty, helping them to get a better start upon their academic careers. The new faculty members introduced to the use of index cards for soliciting formative assessment have found it to be a valuable tool, which they continue to use despite neither being required nor asked to do so. They have all benefited by becoming more effective instructors who are “in tune” with their students, who are in turn receiving a better education due to the responses of their instructors in improving their courses based on student input.

Bibliography

1. T. A. Angelo and K. P. Cross, “Minute Paper”, in *Classroom Assessment Techniques: A Handbook for College Teachers*, 2nd ed. San Francisco: Jossey-Bass, 1993.