Practical Note

"Meet a Microbiologist" (MAM) Program: A Teaching Strategy for Motivating Undergraduate Microbiology Students

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This practical note introduces a teaching strategy that can be employed in undergraduate microbiology classes. Results and evaluation of this activity implemented in three universities in the Philippines are presented in this paper.

Keywords: *learning activity, lecture, microbiologists, student perception, teaching strategy*

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INTRODUCTION

Teaching microbiology is a challenge for many teachers of undergraduate biology or microbiology courses. Motivating students to learn microbiology and/or pursue research or a career in microbiology is equally challenging. With many distractions from the cyberworld, it is important for those handling microbiology courses to find ways to motivate their students to learn more about the subject matter. Teachers of microbiology often develop several teaching strategies aimed in making our lectures more lively, fun, and appealing to our students.

Some of the active learning activities often employed in classes are games, skit-writing, and role playing as exemplified by the "General Hospital" assignment (Dolberry 2011), conducting laboratory experiments or research projects (Kaga and Arai 2004, Jacinto *et al*. 2011, Rios-Velazquez *et al*. 2011), writing essays or reflection papers, and facilitating group discussion during lectures or role-based panel discussion aimed in teaching the principles and socio-economic impacts of a particular topic in microbiology (Vrabl and Vrabl 2012).

Curricula or programs are also developed that prepare students for the needs of the industry (Hamilton *et al*. 2012) or that immerse students in current issues, e.g. in public health (Ascencio 2012).

Sato *et al.* (2004) also developed technologies that can be applied in classrooms or in the field.

Equally important are learning activities aimed not only to disseminate information or knowledge but also to motivate students. For example, the Undergraduate Teaching Assistant (UTA) Experience program which Schalk *et al.* (2009) developed provided students with

microbiology knowledge and laboratory skills, and enhanced their communication and leadership abilities needed to be successful in careers in science. Davis *et al*. (2012) used webinar technology which allows interaction between students and invited guests from distant institutions and also enhance the analytical skills of the students. Baynham (2010) also suggested the idea to host scientists in our classrooms. The invited scientists talked about paths they took that led to their present career. They could also provide a more personal view of why they loved science. Students who attend these talks appreciate the speakers and looked forward to life after college.

To update our students with recent trends and developments in science, it is also effective to invite guest researchers, well-renowned scientists, or distinguished professors to talk about their researches or simply present the latest trends in science. However, these delivered lectures tend to be conducted in a more formal setting, *i.e.* in our huge lecture halls or large auditoria where many students can be accommodated. In this paper, we present an alternative approach, the Meet a Microbiologist (MAM) program, in disseminating information and inspiring students through a pool of guest lecturers who can be invited to talk in a classroom setting.

PROCEDURE

Step 1: Identify and invite potential members of the lecture pool

For this purpose, three or four teachers of microbiology from different universities can meet at the beginning of the semester to plan the MAM program. It is noteworthy to invite colleagues from nearby universities or from universities within the same city. This is to ensure that invited guest lecturers will not have difficulty travelling to the host university. Networking is essential to come up with a list of potential guest lecturers. Cooperation between the invited guest lecturers is crucial to the success of this teaching program.

Step 2: Meet with the invited guest lecturers of the MAM program

Plan with them the topic each of the guest lecturers will teach in the respective host classes. Each guest lecturer will deliver one lecture to each of the different host classes at different universities. The topics can be a lecture unit or chapter in the course syllabus, any topics related to the course units, or current or previous researches by the lecturer. Personnel from the industrial sector can also be invited to give a talk. Examples of topics include "culture collection as repository of microbial strains" delivered to students taking an industrial microbiology course, or "taxonomy and ecology of myxomycetes" shared to students of mycology. An invited lecturer from the brewing industry talked on "the magic in brewing: tap into the art and science of beer" delivered to students of industrial microbiology and mycology. Invited lecturers also shared their career path. In this paper, the authors from different universities (Ateneo de Manila University - ADMU, Far Eastern University - FEU, and University of Santo Tomas - UST) and from the brewing industry (Asia Brewery) served as the guest lecturers and/or host professors.

Step 3: Deliver the lecture in the host class

Each lecture can last for 30-40 minutes. The lecture is followed by an open-forum initiated by the supervising instructor. During the open-forum, students freely ask questions regarding the topic talked or any other related topics. Students are also free to ask about the work experiences of the invited lecturer. The lecture is delivered in an informal classroom

setting and attended only by students of the class (Fig. 1). No administrators or other faculty members are invited to the lecture to make the atmosphere of the lecture less formal for the participating students. Only the teacher in charge of the class is present to facilitate the activity.

Step 4: Assess the activity

An evaluation form is accomplished by the students to assess whether the activity would be effective. The students are informed about conducting the post-survey prior to the lecture. Consents to the survey are given by the students prior to the learning activity. No points on grades are given to students for their answers to these evaluation forms.

Figure 1 A guest lecturer from one university delivered a lecture on a specified topic

EVALUATION OF THE CLASS ACTIVITY

In this paper, three cases where 32 sophomore students of B.Sc. Microbiology (UST), 26 junior students of B.Sc. Biology (FEU), and 25 junior and senior students of B.Sc. Life Sciences and B.Sc. Biology (ADMU) participated in this learning activity are reported. Ages of students were between 16 – 20 years old. Five key questions in the evaluation form were answered by the students as positive [yes], negative [no], or no change in perception [same as before] (Fig. 2). The answer to these questions were then tallied up and presented in Figure 3.

Data analysis of the students' perception survey (Fig. 3) showed that 80% of the students appreciated more the role of microorganisms after the lectures. About 68% were motivated to do research in microbiology while 56% changed their viewpoint about microbes. The highest percentage approval (83%) by the students was on their motivation to learn more about microbes. Sixty-three percent of the students indicated that they want to pursue a career in microbiology and other related fields. From these students' perceptions, it can be concluded that the MAM program offers an alternative teaching strategy that can motivate students to learn more about microorganisms and microbiology.

Teaching microbiology and inspiring students to pursue a career in microbiology are equally challenging for many undergraduate teachers. Educators have developed a variety of teaching strategies and learning activities, e.g. hosting scientists, inviting students to attend symposia or conferences, facilitating internships or the on-the-job trainings, etc. Schalk *et al*. (2009) in their detailed study of their UTA Experience program highlighted the importance of such immersion activities. Undergraduates participating in UTA Experience program gained benefits similar to those the student interns in research institutions gained. The UTA Experience program also provided opportunities for participating undergraduates to work closely with a faculty member in developing skills valuable to their future professional careers (Schalk *et al*. 2009).

The MAM program brought together lec-

School _____

Course _____ **Year Level** _____

Evaluation of Class Activity: Meet a Microbiologist Program

Instructions: Kindly evaluate the activity and answer the survey questions below. Note that no points will be added to your grades in completing this survey. Participation in this survey is voluntary. The purpose of this survey is to assess the usefulness of the activity in teaching microbiology and motivating students.

Encircle your choices.

After listening to the talk, did the lecture help you

1. change your perception of microorganisms?	YES	Same as Before	NO
2. appreciate more the role microorganisms play in nature?	YES	Same as Before	NO
3. motivate you to learn more about microorganisms?	YES	Same as Before	NO
4. motivate you to do research in microbiology?	YES	Same as Before	NO
5. motivate you to pursue career in microbiology or related field?	YES	Same as Before	NO

Any comments or suggestions on the class activity?

_____

_____

_____

_____

Figure 2 Evaluation form accomplished by the participating undergraduate students

turers from different institutions to aid in teaching certain topics in microbiology. The student participants of this program benefited from the different teaching styles and experiences of the invited guest lecturers. Furthermore, the MAM program allowed students to interact with their guest lecturers and to learn more about their career path. The MAM program avoids the formality of a lecture-seminar often given in a lecture hall or auditorium, and thus, renders the students to be at ease during the lecture. Since different teachers are invited to give different lectures in a class, the students also benefited from the different teaching styles and experiences of the lecturers. A lecturer from the industry can also provide a different perspective or approach to the topic. Baynham (2010) noted a positive impact on student's career considerations when several speakers were invited to talk to a class in person or via videoconference or videotaped self-interview. Students who attended these activities commented how happy they were to hear what life is really like after college and to hear more about the scientists as human beings. Similar feedbacks were also noted following the MAM program.

ALTERNATIVE TEACHING ACTIVITY: *Interview a Microbiologist (IAM)*

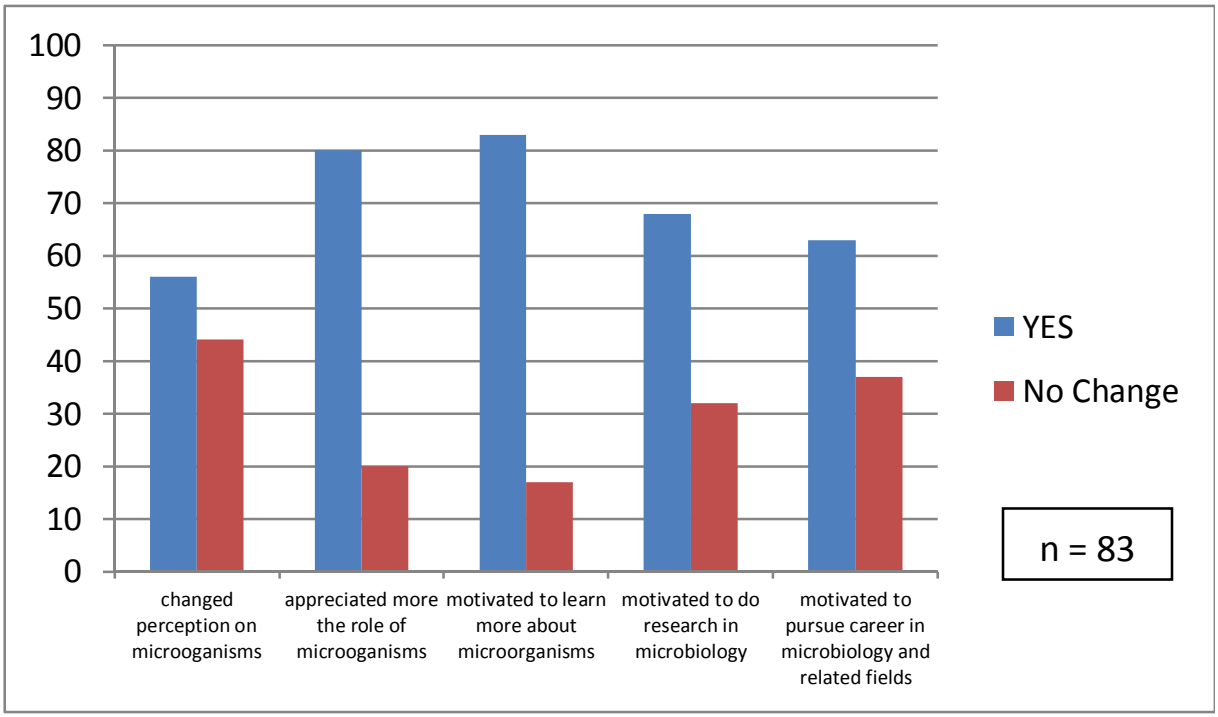

Figure 3 Percentage of the students' responses to the five perception survey questions

A variation of the MAM program, the "Interview a Microbiologist" or IAM program can be an alternative to the teaching activity presented in this paper. In this IAM program, students are tasked to interview a microbiologist and learn more about the microbiologist's researches, motivations and goals, and road to success. Prior to the interview, students will prepare 10 questions they will ask. The teacher or instructor of the class can then facilitate the meeting of the students with an appropriate microbiologist from another university, research institution, or industry. Students may record or videotape the interview with permission from the interviewee. Students can then present orally their experiences to the class or write reflection papers. This variation of the MAM teaching activity can also inspire students to learn more about microorganisms and motivate the students to pursue a research or even a career in microbiology.

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