STUDENTS' PERCEPTIONS OF THE VALUE OF ILLUSTRATIONS IN TEACHING A MANAGEMENT INFORMATION SYSTEMS COURSE

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ABSTRACT

The ongoing thrust towards pedagogical improvement in management education has resulted in the development and adoption of a wide range of tools for use in the management classroom with a strong emphasis on experiential learning. Although a relatively new field, the pedagogical focus in the field of Management Information Systems (MIS) is the same. In this paper we present the use of illustrations as another effective pedagogical tool for MIS educators. We provide examples of illustrations used in teaching an undergraduate MIS course and share feedback from the students on the value of simple illustrations to their comprehension of theoretical material.

Introduction

For management educators there exists a wide array of pedagogical tools, tried and tested, which are extensively utilized in the teaching-learning process. Pedagogical tools in the management pedagogical toolbox include traditional lecture; interactive lecture; action memos; case analyses; varied forms of arts-based learning – musical, drama, literary, visual and movement arts and storytelling; and e-learning tools (Alavi, Yoo & Vogel, 1997; Baruch, 2006; Leidner & Jarvenpaa, 1995; Malins & Pirie, 2003; Mingers, 2000; Nissley, 2002; Sabine, 2002; Thomas & Boje, 2004). The traditional lecture format as a pedagogical tool receives very little support in current literature. Much of the emphasis on learning is placed on experiential learning in and out of the classroom through use of varied forms including, but not limited to, the formation of learning communities and use of community based learning activities and learning platforms (Becta Schools, 2006; Malins & Pirie, 2003; Massey, 2005; McCarthy, Tucker & Dean, 2002; McLaren, 1989; Meyer, 2003; Rosile & Boje, 1996).

The resounding support for change in pedagogical approaches is based on the need to respond to the demands of employers for workers who are able to function effectively and responsibly in the workplace. To function effectively and responsibly in the business world students in the management classroom must learn how to comfortably and competently work in teams, work with very little supervision, use technological tools, and learn on the job. The graduate, new hiree, on entry into the world of work must be equipped with team work and team building skills, critical thinking and analytical skills, communication skills and technological skills (Black & Thomas, 2003). Thus, pedagogical tools utilized in management classrooms today (traditional or

virtual classrooms) comprise various forms and effective learning occurs when all or a variety of tools from the management pedagogical toolbox are utilized.

In the relatively new field of Management Information Systems (MIS), research on teaching and learning activities in classrooms specifically considers direct design and implementation of curriculum and support technologies (Frank, 2005; Hardaway, 2005; Heckman, 2006; Smith, 2001; Sutcliffe, 2005). The primary objective of research on teaching and learning in MIS classrooms is to provide pedagogical tools for educators that will assist them in effectively presenting MIS concepts so that students understand and appreciate the usage and value of computers in business processes (Ellen, 2005; Sheu, 2006; Smith, 2001; Wagner, 2004). The focus is on pedagogical styles through which students are engaged in experiential learning. Thus, all the tools contained in the Management Pedagogical toolbox are applicable for use in this field and educators are being encouraged to utilize as many of these tools as possible in the delivery of instruction in their classrooms (Angel, 2001; Ellen, 2005; Heckman, 2006; Sheu, 2006; Wagner, 2004).

What has not been observed in the current literature is a strong emphasis on the use of simple, relevant illustrations in teaching MIS and a resource pool containing examples of illustrations that could be used by MIS educators in linking everyday, routine, life tasks and activities to student learning in MIS courses. Where abstract concepts form the basis for practical applications, as is the case with MIS, it is essential that students grasp the general ideas and concepts in order to be able to apply these concepts in practice; the college laboratory and the work environment (Angel, 2001; Sheu, 2006; McMahon, 1995). One way to support active learning based on linking concepts to practice is to allow students to explore links in the material under study with everyday processes; the simple, taken-for-granted, routine, monotonous, everyday life processes (Sheu, 2006).

The use of illustrations[4] in interactive lecture sessions is one way to support students' exploration of concepts with the primary objective of ensuring that the concept can be successfully applied by the students. Illustrations can take various forms and can be utilized with varying objectives. The authors have used simple, everyday, routine activities and processes as examples (illustrative form) to explain difficult MIS concepts (objective) during class and laboratory sessions. Our findings indicate that simple illustrations (examples based on everyday, routine activities) when used appropriately to explain difficult concepts provide value to students by increasing their comprehension of the concepts and their ability to make the transition from knowledge to application in the laboratory and work setting.

This paper aims to fill the gap in research regarding pedagogical tools available for use in the MIS classroom by presenting illustrations as a valuable pedagogical tool. Using results and analysis conducted on an undergraduate MIS class, we demonstrate how links can be made between MIS concepts and life processes; provide examples of illustrations used in teaching the course; and share feedback from the students to highlight the students' perceptions of the value of simple illustrations in their comprehension of the theoretical material.

[4] The word "illustrations" employed in this text refers to examples that help explain concepts. This usage is based on the definition provided by the Cambridge Advanced Learners' Dictionary.

Illustrations for use in the MIS classroom

Illustrations can take varied forms. Essential to any teaching-learning activity where illustrations are employed is the simplicity, appropriateness, and relevance of the illustration(s). We have found the following illustrations to be very useful in teaching MIS to our undergraduate students. We present the MIS concept, its relevant illustration and demonstrate the link between the concept and the illustration.

(1)
MIS Concept: Computer Memory
Illustration: Cash Register
Link:
Computer Memory – first-in, first-out (FIFO) register memory. Each slot contains bits (0 and1) which may or can be selected in sequential or parallel order; bits in and bits out. Each slot can be selected in sequential or parallel order. In the cash register, the slots contain various denominations of money. Denominations can be selected sequentially, from lowest to highest or highest to lowest. Denominations can also be selected in any manner or haphazardly, that is, in parallel.
The illustration provides a visual representation of the memory process in the computer. Students can use the illustration as the basis for understanding the computer memory process. Although abstract as a theoretical point, the illustration provides the visual aid which makes the concept clearer. Additionally students are able to refer back to the illustration when they need to apply the concept

(2)
MIS Concept: Parallelism or Serial Mode of Operation.
Illustration: Washing Machine & Dryer.
Link:
In parallelism the processor performs an instruction, for example a fetch. While performing a second instruction, the processor can also perform another function, such as an arithmetic calculation. The same process occurs with the washer-dryer. Parallelism occurs when the washing process is completed by batches. One set of clothes is washed (in the washing machine) and placed to dry (in the dryer). During the drying process for the first batch of clothes watched the second set is placed to wash and washing is completed during the same time that the fist batch is drying. Alternatively, washing could be done in its entirety, using the Serial Mode of Operation. In this case all clothes sets are washed and set aside for drying. Once all washing is complete the drying process takes place.
In addition to providing an excellent visual, as a real-life illustration, this example stimulates students' interest in the subject matter. Students are be able to recapture the visual very easily and are able to relate easily to a very simple, routine, every day task.

(3)
MIS Concept: Data versus information.
Illustration: NASA's Mars Pathfinder Robot Explorer, worth more than one 100 million dollars.
Link:
For data to be useful it must be analyzed, that is, organized into a useable form, information. The accuracy of the analysis of any data is important if the meaning of the data, the information, is to be of any use to the user or business enterprise. NASA's team had data, the raw facts. The

analysis of the data proved inaccurate. What was essential was the verification of a unit; miles verses kilometers. As a result the Mars Pathfinder, worth more than one hundred million dollars was lost. A simple verification of the units, which were recorded in the data as kilometers rather than miles which was the assumption made by the NASA team, would have prevented the loss. The impact of this illustration is on tying in a real-life example and demonstrating the importance of accuracy in data interpretation and subsequent use in decision-making. The example helps clarify the differentiation between the data and information, a critical concept in MIS education, but its use is important in emphasizing the need to be accurate when interpreting data for use in crucial decision-making processes. The learning for the students is two-fold; this should build an awareness of their role as future workers in the MIS field.

(4)
MIS Concept: Volatile (Random Access) Memory.
Illustration I: Electronic Garage Gate Opener.
Illustration II: Gasoline.
Link:
Volatile memory needs to refreshed periodically. The voltage level in RAM needs to be refreshed in order to keep data or instruction stored in memory. Otherwise this data or instruction can be lost. The removal of battery, the power source, from the gate opener causes the code, stored in RAM, to be erased. Once lost, the code has to be reprogrammed when the battery is replaced to open the garage. Gasoline, if left out in the open or left exposed, evaporates. To ensure that the material is not lost completely, the container or receptacle containing the gasoline must be continually replenished.
Both illustrations are simple and relevant to the concept. The loss of the code represents a loss of instruction or data which is essential for functioning of the gate opener. In this sense the code is volatile, easily erased as the power source is removed. Gasoline is an excellent example for use here. First, students know gasoline well; they use it in their vehicles. Second, they have heard and learned about its volatility and the associated problems with storage. The concept of volatility is made clearer by this example.

(5)
MIS Concept: Central Processing - The Central Processing Unit (CPU).
Illustration: The Human Brain.
Link:
The Central Processing Unit receives input from the keyboard and mouse and processes the instructions based on the commands received from the input devices. Examples of output activities would include the printing of a document or the result of an arithmetic function carried out on a set of numbers. The human brain as a central processing unit receives input from sensory organs (eyes, ears, skin, etc.) and processes this information. The result or output would be a response or action by the organ in response to the information processed by the brain.
This illustration encourages an application of routine processes, actions that we take for granted. Pulling a hand away from a hot object; blinking when an object comes too close to one's eye or when suddenly exposed to bright light; and the immediate response to cover one's ear or move away from an area when a sharp or shrill, loud sound is heard are routine, daily actions that humans perform; many of these are taken for granted. Students are invited to explore the process

play that occurs in the human brain when stimuli are received and appropriate responses take place. This helps students to relate what they know to a new concept; processing by the CPU.

(6)
MIS Concept: Firewalls.
Illustration: Walls / Fences / Gates / Burglar Bars.
Link:
Firewalls are computer programs that limit access into and out of a network. Access policies are utilized to allow legal users access and prevent illegal entry. Walls, gates, fences and burglar bars, individually or in varying combinations, are utilized for the purpose of preventing illegal entry into homes or buildings. These structures serve to deter illegal access or entry into homes and buildings; providing some measure of protection for home owners, visitors and clients. This simple illustration reinforces the important function of firewalls; protection against illegal entry. The example provides students with a memory base. The importance of this illustration is its simplicity and ease of relatedness.

(7)
MIS Concept: Fuzzy verses Digital Logic.
Illustration I: Hotel reservations.
Illustration II: Human Decision-Making
Link:
Fuzzy logic allows for research that presents knowledge that is not precise or exact. Everything presented in the research does not have to be true or false, black or white, or yes or no. If check out time for one hotel is 11:00am and there is no flexibility with the 11:00am time then a client(s) who checks out after 11:00am will be charged the daily rate for the room(s). If check out time is 11:00am and hotel allows room for late check outs, the client will have to request late check out and will be allowed to check out at a later time without charge; this is fuzzy logic. In human thought processing humans have the option of responding to a decision-making process or question with a maybe, a yes or a no. If during a decision-making process we are unclear as to what our decision should be a maybe as a response is allowed for. There is room to wiggle with the use of maybe (gray area; this is fuzzy logic.
Most students find this illustration simple and easy to understand and the concept of fuzzy logic becomes clearer. Interest in the subject matter is enhanced as students' find the material easier to comprehend.

The effectiveness of illustrations in teaching is based whether they achieve the objective, which is to ensure learning takes place. Students can be encouraged to explore the illustrations further or in greater depth, if possible or students can be provided with the illustration and asked to explain how the illustration relates to the concept. Alternately, students can be encouraged to find examples that could help them relate every day life processes to concepts in order to improve their understanding of subject matter. Learning through illustrations takes place if students are able to understand the material and are able to explain the material in follow-up activities. A very effective tool for evaluating teaching methods like this one is informal student feedback on class lectures and sessions. We present students' feedback on the use of illustrations in an undergraduate MIS course in the following section.

Students' perspective on the value of illustrations

In our classes we use progressive student feedback to evaluate teaching and learning throughout the semester. In our feedback process we use simple questions, usually three or four questions. Where possible, throughout the semester we make adjustments based on students' responses. The aim is to improve the learning experience throughout the semester. In this case we have utilized responses from feedback sessions conducted during the middle and at the end of the semester. Feedback questions were provided to the MIS students. The questions used asked students to list and describe their likes and dislikes in general and then to highlight their likes as these pertain to class lectures. We found that 91.4% of the students strongly indicated they benefited from the use of illustrations in the class lectures and discussions. Most of the responses highlighted the value of illustrations to understanding MIS concepts and applying and associating concepts to real life situations. The following is a compilation of the students' responses.

> I like the discussions/lecture. It is easy to understand when you put things in your own words and give examples that we can relate to.
> I like the lectures and exercises when we study and discuss real life scenarios.
> Being able to understand what the salesman is talking about at Fry's Electronics and Circuit City is priceless.
> It forces you to think.
> I get a clear understanding of the lecture.
> I like the simple things; I like learning the information that way.
> The definitions and explanations over terms and the material are easily understood; this helps us while studying.
> It made me grasp what I was doing and learning. Students get a better understanding of the class.
> Lecture sessions put material in a way I could understand. The book sucks; explanations in lectures helped.
> The course material seems more relevant to me. I am able to identify the applications to our daily life. Illustrations help us understand the concepts of the course.
> When you break things down it makes the concepts and course seem really easy.
> We were involved and had to use our brains. With the examples I could go back and see how the concepts work. Some people do not get the concept when teachers just state it; the illustrations give visualization and that helps.
> It is easier to understand with the examples and the examples were simple and to the point and easy to picture. Students can comprehend better.
> The concepts were clear and easy to understand. It allows you to see how things are related and how it relates to the real world.
> I understood the material better. Made me think more and have an open mind.
> I was able to think about the subject matter and visualize things and understand better.
> It helped me to understand the concept; the explanations like that were great; I remember the concepts better.
> It helps me to create a picture in my mind about the concept.

Examples help us understand better. It helps us understand how concepts can be applied in real life and it is easier to complete homework problems by remembering the examples.
I like the real life examples. They make the lecture sessions interesting and informative. Helps us understand concepts better.
A very realistic approach to theory related questions and information.

Conclusion

We conclude, through our analysis of the students' feedback, that illustrations are extremely useful in enabling students to grasp theoretical concepts in MIS classes. Resoundingly we find agreement among the students with regard to the visual impact of the illustrations provided to clarify concepts that are more abstract in nature. It is apparent that students, once able to get a visual image of the concept through illustrations found the information much more useful and relevant to the field of study and their lives. Students also indicated that sessions were very informative and interesting; an indication that students were not bored, but actively engaged and responsible for their learning. We have also noted an improvement in students' ability to apply the illustrations in completing homework, projects and examinations. Many students were able to effectively use the examples mentioned in class to address thought-provoking questions used in the short answer and essay sections of class examinations.
Today, the approach of management pedagogy is to provide room for engagement and active participation by students in the classroom. The experiential approach to teaching and learning in management classrooms has replaced the less commonly used traditional lecture format, which left little room for active learning. Experiential learning allows for engagement that allows students to think critically and apply material to life processes. Interactive lecture formats provide for a balance between the traditional lecture and experiential learning. The use of illustrations in the MIS classroom is the springboard for transitioning from traditional lecture to experiential forms. We hope that this pedagogical tool will be utilized by MIS instructors to enhance the learning experience for students.

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