

Promoting Higher Order Thinking In MIS/ CIS Students Using Class Exercises

Arup Mukherjee
Management/MIS Department
University of West Florida
Pensacola, FL, 32514, U.S.A.
amukherj@uwf.edu

ABSTRACT

It has been argued by many writers that it is necessary to develop critical thinking skills in MIS/CIS students because these skills are needed by them to tackle the complexities of real life problems that they are likely to face. While the goal is clear, it is not well understood how to go about achieving it. In this article we report on the use of ten class exercises in a Decision Support Systems course to promote higher order thinking skills in students. These class exercises improve student attendance, their understanding of the relevance of the course materials, and engage them in a process of analysis and evaluation which in turn sharpens their critical thinking skills. The instructor is also able to bring out details of complexities that are likely to be encountered in practice and discuss strategies that have worked in practice.

Keywords: Critical Thinking, Active Learning, Class Exercises, Decision Support Systems

1. INTRODUCTION

Students in information systems programs such as Management Information Systems (MIS) or Computer Information Systems (CIS) are exposed to a great amount of information pertaining to their fields. They are also provided with opportunities to learn software based skills that are likely to be in demand when they graduate. As the amount of knowledge has grown, instructors have been burdened with the task of communicating a large amount of content to the students. This over emphasis on content and software skills has resulted in lack of emphasis on the important skill of critical thinking that is necessary in order to successfully deal with complex scenarios. In reality, MIS and CIS students need to be able to solve difficult problems which require them to analyze complex scenarios, understand how sub-systems are interconnected, and understand the kind of tradeoffs that are needed in real situations. All these activities demand critical thinking on their part. It has been our observation that while existing courses meet needs for 'content' and 'software skills', they generally fail to provide the environment for development of critical thinking skills.

For many years, a large number of authors have argued about the need to develop higher order thinking skills in MIS/CIS students because such skills enable information students to tackle the challenges of complex problem scenarios. Shell and Kleen (1992) argue that critical thinking skills enable students to analyze new situations,

create new ideas, and understand complexity. They believe that regurgitation of the instructor's analysis does not imply an ability to think critically. They suggest that students need to perform their own analysis, synthesis and evaluation in order to develop critical thinking skills. Dalal (1994) argues in favor of developing higher order skills in information systems students so that they become capable of thinking critically and creatively about technical and managerial issues relating to design and use of information technology in solving business problems.

But what is 'higher order thinking' or 'critical thinking'? Many authors have attempted to answer this question. For extensive coverage of this topic we refer the reader to Bloom (1956), Jenkins (1998), Dalal (1994), and Guillemette (1991). Blooms's taxonomy has withstood the test of time for over 45 years and we find it quite useful for our discussion about higher order thinking. In this article, the phrases 'higher order thinking' and 'critical thinking' are used interchangeably. Bloom (1956) identifies a category of objectives called 'cognitive' objectives. This set of objectives deal with whether a student is able to perform in certain educationally desirable ways after instruction. There are six major sub-categories of cognitive objectives and are summarized below based on the work of Guillemette (1991). The sub-categories are listed in increasing order of complexity:

[a] Knowledge: This involves recall of information.

[b] Comprehension: This involves the lowest level of understanding where the reader knows what is being

- communicated and can use it in its immediate context.
- [c] Application: This consists of the application of ideas, principles, generalized methods and theories to particular concrete situations.
 - [d] Analysis: This involves breaking down a communication into its organization, constituent elements and their interrelationships.
 - [e] Synthesis: This involves developing an innovative pattern or structure from elements.
 - [f] Evaluation: This involves the qualitative or quantitative judgments about the value of ideas, methods, and solutions.

We believe that current pedagogical methods do justice to the first three sub-categories. Hence, our interest in this article is focused on the higher order skills of 'analysis', 'synthesis', and 'evaluation'. The literature is quite clear about the need to impart higher order thinking skills to MIS/CIS students. However, it is remarkably silent about specific methods that have been used in class room situations to achieve these goals.

A set of ten class exercises have been developed and used in a Decision Support System class for MIS majors to address the need to provide a structured and guided opportunity to students to practice their higher order thinking skills. These exercises have been used with success in class sizes of up to 35 students.

First, we present a discussion about the nature of the course. This is followed by a discussion about how the class exercises are conducted. An example of a specific class exercise is presented along with analysis of the student responses in that work. A discussion about how these exercises helped students practice their higher order thinking skills is presented. This is followed by a discussion about benefits and drawbacks found in using these exercises. Finally, we discuss limitations of this approach and explore ideas about future research.

2. COURSE DETAILS

A course in Decision Support and Expert Systems is required of MIS majors at this AACSB accredited regional university. The course discusses computer based information systems that are primarily geared towards supporting management decision making. The course emphasizes the holistic view that managers are required to make decisions in a variety of contexts, situations, and scenarios. They are required to make decisions that may be operational, tactical, or strategic in nature. They are required to make decisions in scenarios in which they have reasonable understanding of the forces at work and also in scenarios where they have little understanding of the forces at work. In most of these situations the effectiveness of the decision may be improved by providing access to the right information, the right knowledge, the right understanding, or the right expertise via a decision support system (DSS).

In this course the students study the theory of decision

making and about computer based tools that help in the decision making processes of a variety of end users. This includes a study of decision support systems, group decision support systems, executive information systems, expert systems, knowledge management, and intelligent agents among other topics. In the software part of the course, students learn to analyze, design, develop, implement, and test a decision support system using Microsoft Access. The text used in the course is that of Turban and Aronson (2001).

3. CLASS EXERCISE

Each class exercise has three distinct stages. In the first stage, students read small reports from their text. These reports are typically about lessons learned in practice or applications of DSS to real life scenarios. These reports are typically around half a page in length and students complete the reading in around 7 minutes.

In the second stage students answer five questions in writing on a class exercise sheet. They have access to the report while answering the questions so that they can go back and look for information from the report. The first three questions are recall questions. The last two questions require them to identify the most important and the second most important lesson that they would personally like to remember from this report. These two questions are open ended questions. The students are able to think about what happened in the scenario and how the real problem was solved. They are able to think deeply about what works and what does not and why. These two questions challenge the students to think critically, make sense out of the information and convert the information into useful tips that would be useful to themselves and others. These two questions also encourage students to see the big picture about the particular scenario. This stage takes about 8 to 10 minutes.

The third stage is the discussion stage. This is the stage when the instructor discusses the report and attempts to develop the bridge between the report and the objectives of the chapter. The process is an interactive discussion where the instructor leads the discussion by use of pre-prepared questions. This stage takes about 10 to 15 minutes. Most exercises were completed in less than 30 minutes. The class exercises are graded and constitute about 15% of the class grade. As a consequence, students are quite serious about the exercise.

4. AN ILLUSTRATIVE EXAMPLE

In this section we describe one of the ten class exercises in details. The specifics of the other nine class exercises are listed in Appendix 4. These exercises were used in the DSS course in Fall 2001. Although 10 exercises were developed, only the first nine were actually used due to shortage of time. As and when a new edition of the text comes out, the exercises can be easily adapted to new reports because only the last two of the five questions are important for practice

of these skills. Recall that these two questions remain unchanged over the ten exercises and asks the student to identify the most important and second most important lesson of each report.

4.1. Student Demographics

In the Fall 2001 semester, the class exercises were administered to two sections of students in the Decision Support Systems course. Around 48% were female students while around 52% were male students. The students were typically in the senior year of their four year MIS degree program. There were a few M.B.A. students (less than 10%), taking the course to earn a concentration in MIS. The course was not dual listed and the M.B.A. students did not get graduate credit for the course.

4.2. Class Exercise on the 'Seven Deadly Sins of Decision Making'

The text has a report on the seven deadly sins of decision making. This report is reproduced in Appendix 1. The report includes a summary of seven common mistakes that decision makers make. At times students go out with the impression that they are about to enter a world where they would be quickly able to apply what they have learned in theory to practical problems. Nothing could be further from the truth because real problems always come with challenges of their own. It is reasonable to expect that a person who is aware of the common mistakes would be less likely to make them. A study of this report was expected to balance out the perfect world of theory with the imperfections of the real world.

As indicated earlier, there are three stages in each class exercise. In the first stage, the students read the report in the text on the seven deadly sins of decision making. Then they answer five questions as listed in Appendix 2. In the third stage, the instructor typically leads a discussion to bring out intricacies that are unlikely to be discovered by the students themselves. In the discussion session for this report, the instructor's goal was to identify relevance of this report to the work of a systems analyst. In order to facilitate the discussion the class was asked to identify what implication these sins had for the work of a systems analyst. It was clear that all the seven sins had implications for the work of a systems analyst. However, the class felt that only four of these were important enough to be identified as tips that could be passed on to others in the field. These tips are presented in Figure 1 and discussed below.

1. Analysts must collect information and develop good understanding of the problem.
2. Analysts must prepare meticulously for an interview so that they can ask the right questions.
3. Do not let your own ego stop you from making changes to your own analysis/ design.
4. Do not assume that what works for others will also work for you.

Figure 1. Tips Developed For Systems Analysis During Class Discussion

First, analysts must guard against the propensity to jump to a conclusion about the nature of the real problem. Instead it would be important to be careful to collect information from end users and managers about the real problem that they were facing. Second, it was realized that in order to understand the user's needs, the analyst would have to ask the right questions. This in turn meant that the analyst would have to carefully prepare for conduct of the interview rather than simply jump into the interview. The third tip pertained to the ego. This shows up in different ways for the analyst. Once an analyst has completed analysis of a situation, she feels that this is the right analysis and tries to resist any attempt by others to change her position. And off course, this inflexibility could be expensive because the analyst could end up solving the wrong problem. The fourth tip pertained to the philosophy of 'all aboard the bandwagon'. Real life systems analysts have had their fair share of this practice. From time to time they have had to put up with intense pressure from other departments in the organization who wanted the MIS department to do what MIS departments in other organizations did. Information Systems analysts and designers need to be careful about this because it simply may not be the right thing for the organization. Large investments in web based exchanges or web based services have simply been a drain on the cash flow for many organizations who implemented solutions that were inappropriate for their business models.

4.3. Analysis of Student responses

The main objective of the class exercise was to provide an opportunity to students to practice higher order thinking skills. An analysis of their responses to the fourth and fifth questions is presented in order to investigate how students performed on these two tasks. The fourth question asked students to identify the most important lesson that they would personally like to remember from this report. An analysis of their responses is shown in Table 1. Sins that were identified by less than 5% of students as the most important have been clubbed together. A total of 56 students participated in the exercise in two sections of the course.

Around 68% of the students identified one of the seven sins as the most important lesson for them. Around 32% of the students identified some other lesson as being the most important to them. Only one sin of decision making, namely that of believing that you have all the answers, was considered by around 36% of the students to be the most important lesson for them. No other individuals in was cited by more than 7% of the students. This kind of response suggests that students were quite independent in analyzing and evaluating the lessons in this report and leads us to believe that the exercise did help them practice the higher order thinking skills.

An analysis of the second most important lesson is presented in Table 2. Sins that were identified by fewer than 5% of the students have been clubbed together.

Most important lesson	% of responses
	[N=56]
1. It is a big mistake to assume that you have all the answers	36%
2. It is a big mistake to ask the wrong questions.	7%
3. It is a big mistake to let your ego get in the way of backing down from a bad decision.	7%
4. It is a big mistake to jump onto some one else's bandwagon when making decisions.	7%
5. Other sins among the seven sins	11%
6. Other lessons not related to the seven sins	32%
Total	100%

Table 1. Analysis of the Most Important Lesson

2 nd Most important lesson	% of responses
	[N=56]
1. It is a big mistake to assume that you have all the answers	20%
2. Making no decision can be the same as making a wrong decision	16%
3. It is a big mistake to ask the wrong questions.	7%
4. It is a big mistake to save money by not seeking out information	7%
5. Other sins among the seven sins	12%
6. Other lessons not related to the seven sins	38%
Total	100%

Table 2. Analysis of the Second Most Important Lesson

Around 20% of students felt that it is a big mistake to assume that you have all the answers. A surprising 16% felt that making no decision could be as bad as making the wrong decision. This sin did not show up as a major response for identifying the most important lesson, but showed up strongly when students were identifying the second most important lesson. Once again a large percentage (38%) did not choose one of the sins as their second most important lesson. All this leads us to conclude that students did not fall into the trap of choosing the easy way out of selecting one of the sins.

The fact that widely varying percentage of respondents identified different sins as either the most or the second most important lesson lend support to our belief that the students took this task quite seriously.

Some students were quite critical and creative about identifying their most important or second most important

lesson. The more unique lessons have been summarized in Appendix 3 to give the reader an idea about the depth of understanding achieved by the students in such a short period of time.

5. DISCUSSION

Our goal was to provide a structured and guided opportunity to students to practice the three higher order thinking skills of *analysis*, *synthesis*, and *evaluation*. How do the class exercises lead to practice of these three skills? Recall that *analysis* involves breaking down a communication into its organization, constituent elements and their interrelationships. *Synthesis* involves developing an innovative pattern or structure from elements. *Evaluation* involves judgments about the values of ideas, methods and solutions.

In the first step of the class exercise, students are asked to read a small report in the text. Then they answer five questions in writing. The first three questions are recall questions. The fourth question (fifth question) asks them to identify the most (2nd most) important lesson that they would personally like to remember from this report. In order to answer the fourth question, students have to first break down the report into its significant components and understand the interrelationships of these components. This gives them an opportunity to practice *analysis*. In the second step they are challenged to make sense of the reports and convert their understanding into a lesson that they should remember. This step helps them practice *synthesis*. In order to answer the fifth question, students have to repeat *analysis* and *synthesis* of the report while looking for another important lesson. However, while comparing the two important lessons and deciding that one is more important than another, students practice *evaluation* which involves judgments about relative values of ideas.

Dalal (1994) suggested that higher order thinking combines critical thinking with creative thinking. Critical thinking involves analysis, evaluation, and reasoning. Creative thinking involves synthesis and generation of new ideas. The class exercises described in this article fit in well with this view of higher order thinking. They provide multiple opportunities to the students to practice analysis and evaluation. They also provide multiple opportunities to them for generating new ideas by asking them to individually formulate the two most important lessons from each report. The class exercises ask open ended questions and encourage students to respond freely. This permits them to use their backgrounds and creativity to generate a wide variety of responses.

The format of the class exercises is open ended and permits easy adaptation to other courses. As may be recalled, the first three questions are recall questions based on facts in a scenario. The fourth and fifth questions ask the students to list the most important and second most important lessons from the case study. Because of the open ended nature of these questions, the approach can be easily adapted to

business courses such as Business Ethics, Organization Behavior, Operations Management, Systems Analysis and Design, Conflict Resolution, and Health Care Administration. With a little bit of ingenuity instructors of such courses can find and assign small case studies for the students to read in class and respond to similar questions.

6. BENEFITS

Several benefits of use of these class exercises have been recognized. The major benefits are discussed below.

Students have now received an opportunity to practice and enhance critical thinking skills. At this stage we are unable to present documentation of precise degrees of improvement due to use of the exercises. However, we note that critical thinking and other higher order thinking skills improve through experience and these class exercises gave the students more experience in practicing the skills.

The class exercises were held at random unannounced times. Further, these exercises accounted for around 15% of the course grade. These two factors worked together to ensure high attendance levels in the class.

Many of the class exercises pertained to case reports about use of DSS tools to solve real problems. This helped in increasing student interest in the content of the course as they found the subject matter to be of practical relevance.

The class exercises gave the students an opportunity to practice expressing their ideas in their own language. Many of the students did not use technical language when identifying important lessons that they had personally learned. Yet their communication was more sincere than the write ups of students who used the technical language of the report. Thus they had an opportunity to improve their written communication skills.

During class discussion, the instructor asked questions and led the discussion towards discovery of deeper meaning. The students, in the meanwhile, had an opportunity to improve their oral communication skills as they were engaged to give full and complete answers to questions.

7. DRAWBACKS

Some of the drawbacks noticed are discussed in this section.

The class exercises took up around 30 minutes of class time for ten class meetings. This translates to around 15% of class time over the span of the entire semester. What we gained in terms of improvement of a higher order thinking ability, we lost in terms of the amount of time available for coverage of content.

The class exercises also had to be completely pre-planned by the instructor. The pre-planning included identifying the reports in the text, reading them to evaluate the reports for important lessons, making sure that they were neither too

hard nor too easy for the students, writing the questions that students would answer in the exercises, and also identifying the questions that would be answered in the discussion stage. Further, the instructor had to plan for the class exercises to take place either at the beginning of a class or at the end and had to make it random so that the students would not be able to guess.

8. RESEARCH LIMITATIONS

This research has many limitations. First, no attempt has been made to measure higher order thinking skills. Second, no improvement has been made to provide evidence of improvements in these skills on the basis of pre and post tests.

At the same time, we believe that higher order thinking skills are at best difficult to measure. These skills appear to be similar in nature to problem solving skills which tend to improve with experience. Hence, our focus was on being able to provide each student with multiple opportunities to practice these skills. An academic course is necessarily time bound. Work performed out of class suffers from the disadvantage of students collaborating in uncontrollable manners. We believe that this format of using class exercises under structured guidance from the instructor provided each student with a unique opportunity to practice these hard to teach skills.

Future research may be directed at measuring different aspects of these skills and developing exercises that best improve the different cognitive objectives for information systems students.

9. CONCLUSION

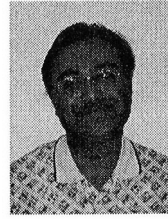
Students majoring in the broad fields of information systems are likely to face complex problems in their jobs. In order to develop appropriate solutions for these problems, it would be necessary to use critical thinking skills. As the total amount of content has increased in information systems courses, instructors have had to make the difficult choice of focusing more on the content and software skills and less on development of critical thinking skills. This is unsatisfactory because students are less likely to be able to rise to the challenges of the complexities that they would encounter in the real world. It is important to develop critical thinking skills without making big sacrifices in either content delivery or development of software skills. A set of ten class exercises have been developed and used for this purpose. These exercises engaged the students in a process of analysis, synthesis and evaluation and gave them multiple opportunities to practice their critical thinking skills. Student attendance improved as well as their understanding of the relevance of course materials. The major drawback was that the exercises needed careful planning on the part of the instructor. However, the benefits outweighed the drawbacks.

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AUTHOR BIOGRAPHY

Arup Mukherjee earned a Ph.D. in Management Science



from the University of Tennessee at Knoxville, Tennessee. He is currently the Chair of the Management/ MIS department at the University of West Florida. He has published his research in such journals as the *Journal of Operational Research Society*, the *Journal of Education for Business*, the *Journal of Computer Information*

Systems, *Decision Support Systems*, and *Education*. His teaching expertise includes *Decision Support Systems*, *Systems Analysis*, *Management Science*, and *Operations Management*. He serves as a Consulting Editor for the *Journal of Education for Business* and the editorial review board of the *Journal of Computer Information Systems*. He also serves on the editorial advisory board of *Computers and Operations Research*.

**Appendix 1: The Seven Deadly
Sins of Decision Making
[DSS IN FOCUS 2.6]**

Sawyer (1999) describes what she calls “the seven deadly sins of decision making.” These are all common pitfalls of decision making that decision makers often unwittingly encounter. They are all interrelated. The seven deadly sins are:

1. Believing that you already have all the answers (no attempt is made to seek outside information or expertise)
2. Asking the wrong questions (you need the right information to make an informed decision).
3. The old demon ego (a decision maker feels he or she is right and refuses to back down from a bad policy or decision).
4. Flying-by-the-seat-of-your-pants saves money – doesn't it? (by not seeking out information, an organization saves money – and makes bad decisions.
5. All aboard the bandwagon: if it works for them, it'll work for us (copying someone else's ideas really involves understanding why and how they work).
6. Hear no evil (discourage and ignore negative advice – kill the messenger with the bad news).
7. Hurry up and wait: making no decision can be the same as making a bad decision (procrastination is not necessarily a good management technique).

Of course, all these lead to faulty decisions that lead to unnecessary and high costs for firms and individuals (including getting fired). Many of these “sins” clearly involve behavioral issues and lack of information and expertise that leads to less objectivity in the decisions making process. Source: Based on D.C. Sawyer, *Getting it Right: Avoiding the High Cost of Wrong Decisions*, Boca Raton, FL; St. Lucie.

Appendix 2: The Class Exercise

Please read DSS IN FOCUS 2.6 on page 56 and answer the following questions
[20 minutes] [Max points = 5] [Each question is worth one point]

1. State the name of the author who described the seven deadly sins of decision making.
2. What is the consequence to the firm of a faulty decision?
3. What could be a negative consequence to an individual of a faulty decision?
4. What is the most important lesson that you would personally like to remember from this DSS IN FOCUS?
5. What is the second most important lesson that you would personally like to remember from this DSS IN FOCUS?

**Appendix 3: A List of Unique Responses From Students About Important Lessons
Learned From This Report**

1. All the seven sins involve behavioral issues.
2. It pays to make well thought out decisions even if it is time consuming.
3. To keep the decision making process an informed, objective, and educated process.
4. When making decisions, asking questions, ignoring one's ego, and focusing on quality will prevent all seven sins.
5. Decision making is a learned skill and one should remember the good and proper steps to prevent any misguided solution. Remember these 7 sins.
6. Never make an uninformed decision. It could cost you money or your job.
7. Many of these deadly sins apply to other aspects of our lives and career.
8. Some of these sins are part of many people's everyday processes; therefore they may not be capable of reforming in order to make 'good' or 'optimal' decisions.
9. These sins are behavioral and come from lack of information and expertise. These are both conditions that can be changed.

10. That everyone is guilty of these sins and understanding what and why someone chooses to do so can be a major step in preventing them.

Appendix 4: Class Exercise Details

[All page numbers relate to the Turban-Aronson text (2001)]

Class Exercise # 1:

Please read DSS IN FOCUS 1.1 on page 7 and answer the following questions.

1. This report talks about a survey conducted by the firm Harbridge House. How many managers participated in the survey?
 2. What managerial ability is considered to be the most important according to this survey?
 3. What managerial ability is considered to be the second most important according to this survey?
 4. What is the most important lesson that you would personally like to remember from this report?
 5. What is the second most important lesson that you would personally like to remember from this report?
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Class Exercise # 2:

See Appendix 2

Class Exercise # 3:

Please read DSS IN ACTION 3.4 on page 107 and answer the following questions.

1. What is the major problem discussed in this report about firms that sell prescription drugs?
 2. Why do loss prevention analysts use automated intelligent procedures?
 3. How many cases of suspected theft were discovered in the very first year of operation?
 4. What is the most important lesson that you would personally like to remember from this DSS in ACTION?
 5. What is the second most important lesson that you would personally like to remember from this DSS in ACTION?
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Class Exercise # 4:

Please read DSS IN ACTION 4.1 on page 139 and answer the following questions. [20 minutes]

1. What is a key factor for smooth operation of a modern aluminum rolling mill?
 2. Troubleshooting required fast access to an integrated body of data, information and knowledge. Why did they not use Conventional DBMS and artificial intelligence for this application?
 3. They decided to use object oriented database combined with a relational DBMS for information retrieval. How quickly could operators find information using this system?
 4. What is the most important lesson that you would personally like to remember from this DSS in ACTION?
 5. What is the second most important lesson that you would personally like to remember from this DSS in ACTION?
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Class Exercise # 5:

Please read DSS IN ACTION 5.3 on page 183 and answer the following questions. [25 minutes]

1. How many truckloads of snow are hauled away each by the city of Montreal?
 2. The first approach was to develop an integer programming model that would find an assignment that minimized the sum of the distances from the center of the sectors to the disposal sites. Why did they not use this approach?
 3. A heuristic method was developed to solve the problem identified in question 2. What did the heuristic do?
 4. What is the most important lesson that you would personally like to remember from this DSS in ACTION?
 5. What is the second most important lesson that you would personally like to remember from this DSS in ACTION?
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Class Exercise # 6:

Please read DSS IN FOCUS 6.3 on page 231 and answer the following questions. [25 minutes]

1. What kind of system did Arthur Anderson develop as reported in this DSS in FOCUS?
2. One of the lessons reported here is that one should 'Rely on fuzzy feedback before hard measures'. Why is this common in DSS?
3. Why should you 'Choose speed and specificity over size and generality'?
4. What is the most important lesson that you would personally like to remember from this DSS in FOCUS?

5. What is the second most important lesson that you would personally like to remember from this DSS in FOCUS?

Class Exercise # 7:

Please read DSS IN ACTION 7.10 on page 275 and answer the following questions. [25 minutes]

1. Customers of Eastman Chemical would present any number of problems. Eastman employees would use flip charts and post-it notes to come up with better solutions. Why did Eastman feel that this method was not effective?
2. How many ideas were generated by nine people in a 2 hour session by use of groupware software called 'GroupSystems'?
3. Henry Gonzales found that by using GroupSystems they had a richer pool of ideas to choose from and got to the point a lot faster. What other benefit pertaining to '*ideas*' did he find?
4. What is the most important lesson that you would personally like to remember from this DSS in ACTION?

5. What is the second most important lesson that you would personally like to remember from this DSS in ACTION?

Class Exercise # 8:

Please read DSS IN ACTION 1.1 on page 318 and answer the following questions. [25 minutes]

1. What is the name of the world's largest revenue producing pharmaceutical firm?
2. What factor prompted Welcome to install an EIS to help senior managers track product and sales information?
3. What does OLAP stand for?
4. What is the most important lesson that you would personally like to remember from this DSS in ACTION?
5. What is the second most important lesson that you would personally like to remember from this DSS in ACTION?

Class Exercise # 9:

Please read DSS IN ACTION 9.12 on page 368 and answer the following questions.

1. In the digital age, knowledge is considered to be the lifeblood of the Xerox Corporation. What is considered to be the DNA of knowledge?
2. Xerox was originally a copy machine developer and manufacturer. What does it consider itself to be now?
3. What activity has become a way of life at Xerox?
4. What is the most important lesson that you would personally like to remember from this DSS in ACTION?
5. What is the second most important lesson that you would personally like to remember from this DSS in ACTION?

Class Exercise # 10:

Please read AIS IN ACTION 10.3 on page 408 and answer the following questions.

1. What kind of service does a 'merger and acquisition' expert system provide pertaining to negotiations?
2. What kind of service does SMARTPlan provide pertaining to achievement of economic success?
3. What kind of advantage resulted pertaining to the 'duration of stay in port' when a family of 10 expert systems was used by the port of Singapore?
4. What is the most important lesson that you would personally like to remember from this AIS IN ACTION?
5. What is the second most important lesson that you would personally like to remember from this AIS IN ACTION?
