

Special Topics in Information Systems Class Building the Human Component First

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Abstract

Most information systems classes focus on the study of hardware, software, data, communication, procedure, and employees. Employees usually are divided into end-user, IT people, and management. There is a need to teach classes in information systems directly related to the progress of the human as the most important component in any information system. The class invites the students to examine themselves as employees in an ever-changing field. The class attempts to relate many topics to the study of information systems. Students' feedback and input are encouraged at the beginning of the class to form the list of topics to be covered. These may include creativity, critical thinking, obstacles to learning found in one's self or the environment, the difficulty in maintaining a productive relationship in the workplace, impact of the global market on IT, and cultural difference and appreciation, among many. Experienced people were invited as guest speakers. Based on the feedback from the students over the last few years, this class is much needed to position us, as humans, as the most important building block in any information system and, as a result, the rewards to the students have been phenomenal.

Introduction and the Problem Statement

Most information systems books discuss information systems by including six major components. These include hardware, software, data, telecommunication, people, and procedures. The people are divided into end-users, management, and IT Staff. This type of study usually includes a systematic approach with great emphasis on the interdependency among these elements.

This approach is important to understand the essence of these relationships among these elements. Of course, technical skills are essential to a student's success in the field. The need to understand software development and the existing difference among the major categories within the software industry is vital to any student who will become a systems analyst.

What is missing in the process of educating and preparing students who pursue a degree in information technology goes beyond these components. A student who majors in information systems study needs to understand additional concepts and skills. What are these skills and concepts that are critical to a student who is majoring in computer information technology? To answer this

question and to fulfill this gap, the Department of the Computer Information Technology at Florida Keys Community College (FKCC) offers a Special Topic in Information Systems. The focus of the class is on building the human component. Students are exposed to a variety of topics. These include the distinction among data, information and knowledge, computer literacy vs. information literacy, evolution of information systems, critical thinking vs. creative thinking, problems and how to deal with them, outsourcing of information technology and its impact on employment, basic philosophy applied to the instruction in the class, and finally the support of administration.

Research Background

The use of technology for the sake of technology is a losing battle especially when dealing with the unexpected and ever-changing requirement of the business world. Through our experiences as educators and administrators, we hear many stories where impressive and capable technology ended up as an expensive paperweight in somebody's office or basement. People performance undeniably increases by the use of technology, however, if the problem is not clear, no super-computer can produce a desired outcome. We can truly automate a tedious task and save ourselves incalculable number of hours by using the proper technology. If this automated task was not well planned and its processes were not explicitly understood, we obtain undesired outcome.

To rely on technology mainly to solve a business problem without putting the human first is a call for an undesired result. From an interview by Business Management Asia with Dr. Yogesh Malhotra titled "Is Knowledge the Ultimate Competitive Advantage?" Dr. Malhotra stated, "to thrive in this environment, businesses need to rely not only on the data processing capacity of IT but also on creativity and innovation of people - both inside and outside the organization."

Shapiro and Hughes (1996) invited us to look at information literacy from many angles. The author did not deny the importance of taking classes in Microsoft Windows or knowing how to search the Net, however, they stated that:

"...new curricular framework: one that equips people not only with a bunch of technical skills but with a broad, integrated and critical perspective on the contemporary world of knowledge and information, including its origins and developmental trends, its redefinitions of experience and social life, its philosophical justification, biases and limits, its potential for human emancipation and human domination, and for growth and destruction."

It is clear that the problem of relying on systematic and technical solutions is not an adequate answer to most business problems. This paper shows that the need to teach the course in Special Topics in Information Systems with the emphasis on building the human component with essential skills is an assuring factor to the success of any information systems. After all, as stated by one of my students, "humans don't get obsolete."

Common Objectives of the Class

This section discusses the topic usually covered in the class. Before confirming the syllabus objective and due to the nature of the class, the students have a week to come up with additional

items to be added to already selected items by the instructor. Usually, students are happy with the selected list. However, what students come up with add an additional dimension to the class. The following objectives are usually suggested by the instructor, and students are asked to agree or disagree with the list. The syllabus states:

Upon successful completion of this course, the students will possess the knowledge and ability to:

1. Understand the types of information systems, their evolution, and their application
2. Understand what is meant by creativity to IS environment
3. Understand problem-solving techniques and how to apply them in real-technical environment
4. Apply brainstorming, mind programming, and mind mapping
5. Clarify what critical thinking means and how to apply that understanding to everyday situation (when needed)
6. Understand the barriers to critical thinking.
7. Deal with cultural, psychological, and environmental barriers to creative problem solving and critical thinking
8. Understand the philosophical roots for new technological innovations such as object-oriented technology and database management
9. Put all or some of the learned ideas in a website
10. Guest speaker will be invited for an outside discussion
11. The instructor will work closely with the Vice President of Instruction and the Dean of Businesses and Technology for additional help

Discussed List in Class 2004

Since this class is covered only one time a year, the class of the year, 2004 included the discussion of multiple topics. The length of this paper does not allow for all the discussion that took place in the class, therefore we selected the major topics. These include information and systems, evolutions of information systems, computer literacy vs. information literacy, critical thinking vs. creative thinking, and finally, outsourcing of information technology and its impact on employment.

Information & Systems

The first lecture of the class starts by defining the two terms: Information and Systems. To understand the significance of the term information, a need to relate information to data and knowledge is very important.

Data. For the students to understand the full meaning of the term information, the discussion starts by asking whether data and information are interchangeable? Or, in a simple term, if both terms refer to the same concept. Most students agree that the two terms have the same connotation. When the question is asked, “Can input and output mean the same thing? the students become aware of the difference when input is associated with data and the term output is associated with information. Data become information through the conversion state known as the processing stage. The processing stage includes the set of rules that converts data (the raw facts) into more meaningful result, that is information. It becomes clear to the students that by correctly processing lots of data, we obtain information.

Information. The next question “...whether, as a human race, have we accumulated lots of information?” the subject of the question that leads to a debate and an interesting lecture. Some students feel we do not have enough information, while others complain about the vast amount of information we generate every year. When the students were confronted with the fact that we double the amount of information every few years, they realize the problem. We generate too much information, but we still deal with too many problems in every social and scientific field. The amount of information could add an additional confusing element, especially when we have to deal with an incredible and unfiltered amount of information.

Knowledge. The following question is that “if we process information further by applying additional rules what do we obtain?” After multiple guesses, students agree that knowledge is the right term. Knowledge has a deeper meaning and adds awareness to any condition. Even though information can answer questions such as who, where, what, when, and how, it cannot really explain why a condition exists. For example, when a student registers for Introduction to Computer Application class, we can tell the student’s name, what time the student will attend the class, where the class is held, who teaches the class, and we also can tell how the class will be taught by reading the syllabus. With all that, we could not tell why the student chooses this specific class with that particular instructor, or why the student prefers that period of time. Unless we are able to answer these questions, we will not be able to know every detail about the student’s condition and any advice provided to the student might be incomplete.

Systems. A system is made up of at least two or more components that must interact to provide a specific purpose. After naming the parts, it is critical to understand the relations among these parts. The class shows that an information system is not made only of its components, but also relations that link them. The more we understand these relations, the easier it is to deal with the system.

Computer Literacy vs. Information Literacy

Students should be able to tell the difference between computer literacy and information literacy. One major goal of the class is to create a full understanding as to what it takes to become information literate and how to maintain it. By reviewing the literature to find a satisfactory distinction between the two phrases, there were many characterizations. On the Penn State University web site, a page titled, "Information Literacy vs. Computer Literacy—One University's Definition," the author defined computer literacy as "the understanding of what computers can and cannot do, and the ability to use both hardware and software appropriately and skillfully." The author defined information literacy "as a group of critical thinking skills which consists of individuals' abilities when they have an informational need and to use necessary technology to access, evaluate, and use information effectively."

It is clear from the above definitions that information literacy requires additional skills beyond understanding how hardware and software work together to accomplish a specific task such as writing a term paper. Information literacy involves critical thinking and the ability to choose among many alternatives. Further, information literacy requires the evaluation and application of information to solve problems of different scales. These problems range from personal to prodigious ones.

We can add that for students to become informational literate, they have to look consciously to additional components other than the technological ones. In addition to critical thinking, a student needs to think creatively in many situations. A student needs to understand the nature of problems and how to deal with them effectively.

Evolution of Information Systems

This lecture covers all type of information and how they evolved over the last 60 some years. Students will realize how a transaction information system is used on a daily basis to collect data from customers, employees, and any input in the accounting systems. These collected data from the transaction system can be used to produce summaries and to generate a variety of reports that help the management in their decision making, thus creating the Management Information Systems (MIS).

The Decision Support System (DSS) is discussed as the next progression in the field of information systems. DSS allows for ad hoc reporting. The main focus of DSS is to enhance the decision making rather than replace it. The next generation of information systems is an expert system (ES). ES can replace a human expert in the decision making since it includes a knowledge base. The knowledge base is usually extracted through a knowledge engineer who puts the experts' knowledge in a set of rules for later access. Both DSS and ES are considered intelligent information systems given that they incorporate human intellect.

The discussion moves to cover executive information systems. This information system assists top management in their strategic decision making. These systems come with an easy interface and include highly critical information gathered internally and externally by the organization. The last information systems discussed is the virtual office or automation systems where multi-

ple technological innovations are used to solve everyday business problems. The dialogue in the class covers the convergence of the technologies ranging from word processing to two-way/video-two-way-audio videoconferencing. Further, we discussed how Internet has reshaped our communication, our manner of buying, and the way we get educated.

These are comments from the class regarding the evaluation and obsolescence of computer systems:

1. "One of the things that I really enjoyed about the conversations in the class, even though we are all pursuing a computer degree, is that the human element [in an information system] will not soon become obsolete."
2. "When an information system needs to be attuned, a programmer has to write and enter new coded instructions. Our brain does this work automatically both in the early childhood and in adulthood."

Critical Thinking vs. Creative Thinking

Understanding different types of thinking is critical to the success of an information systems student. Students are handed two problems. The first one requires critical thinking skills to be solved. The second requires creative thinking. The instructor asks for individual answers. Most students tend to find a solution to one of the two problems. Students are asked to state which one of the two problems is easier to solve. By identifying their style of thinking, students will be able to tell initially whether they like to solve problems critically or creatively.

Students are asked to write a paper by researching critical thinking. By defining, discussing, and listening to each student, the group understands and agrees on a general definition to critical thinking. Students also are encouraged to apply critical thinking to suitable situations in their future projects.

The next week students are asked to write a paper about creative thinking. Again, the students are expected to read and debate their findings. Once there is a consensus, the instructor asks students to revisit the earlier discussion about critical thinking and ask for comparison and contrast between the two types.

The following section contains comments from students after their research and involvement in discussing the different aspects of critical and creative thinking. These comments indicate the extent of students' involvement in discussing and applying the learned concepts:

1. "We [must] set aside our beliefs, fears and way of thinking and approach [problems] objectively, analytically, logically and clearly."
2. "A treat which I found second only to Julie's cupcake and pumpkin pie! The best way to change negative thinking, the biggest hindrance to creative thinking, is to become aware of it. Like trouble shooting and problem solving, we cannot fix anything until we know what is broken..."
3. "Once you know where you are, creating your own behavior becomes less difficult to change."
4. "We can change our world and the way we perceive it. We can do much with less effort...if we only remain aware of our thoughts."

5. "Just to make meaning out of thinking was fascinating."
6. "I learned about red and green thinking and how being open minded is very important."
7. "Distinguishing between facts and opinions...and making valid statements are all critical."

Problems and How to Deal with Them

To assist students to see problems as a potential opportunity for growth and a motivation for change in an environment that is constantly evolving, students are asked to define the term "problem." Students tend to introduce a negative connotation to the term problem. The students are reminded that the concept of problems we are seeking in our field, information systems, is not all adverse. Problems are the root of new learning paths that might lead in the long run to huge savings and productivity.

Students are asked to distinguish between symptoms and problems and try to evaluate situations and avoid dealing with symptoms, and to tackle the problem at hand with an open mind and a desire to achieve a solution. Students also are asked to avoid the assumption that they already know the solution and they should avoid arriving at the solution without thinking first (Problem Solving, 2000).

There are many thoughts provided by students on the nature of problems and how to deal with them that prove that they applied a high level of concentration:

1. "In dealing with my problems, I learned that sometime my critical thinking can stagnate my creative thinking which can turn out to be a problem for me. Well guess what, I have come to an agreement with myself to solve this problem. I need to take a deep breath, slow my thought patterns down some, and realize that everything doesn't always have to be so urgent."
2. "So looking at our problems as opportunity is excellent advice."
3. "Therefore, as long as we live, we need to try to develop our problem solving skills."

Outsourcing of Information Technology and Its Impact on Employment

Students are aware of the fact that globalization and outsourcing are reality. Some tend to be fearful that they may not get a job after finishing their degree. As a result, students are asked to research the impact of outsourcing technical skills to employees overseas. The challenge is there and students must understand how to prepare themselves for a competition that is no longer restricted to any geographical area. The world has become the community. The class discusses the skills that are needed to find and maintain their employability.

In the article "Challenges in Outsourcing and Global Development: How will your job change?" Dennis Mancl stated that people such as software developers can be threatened by outsourcing. In order for these people to keep their jobs, they must possess valuable skills such as "domain knowledge," "productivity," and "soft skill." Further some additional skills are:

1. Ability to deal with people including end users and customers
2. "Cultural empathy (ability to work across the teams with folks in different countries/cultures)"

3. Ability to deal with uncertainty

The following comments were selected from the students' papers to show their understanding of the requirement of globalization and the need to be aware of the changes that impact the business world. Persistence in pursuing knowledge and understanding cultural differences can help students cope with the issue of globalization:

1. "Knowledge is indeed available from some quality and reliable sources. It just takes a little time and perseverance."
2. "Another feature that fascinated me about the class was factors we discussed. Issues such as cultures and languages. We discussed also how these things influence computer professionals."
3. "While we are able to pick up a new language, a new culture is far more difficult to understand."
4. "For example, Aborigine culture has no written form of communications. Do we keep them out of the computer circle? Well, no, because Art was the most effective language of communication for them and the most universally understood. Let us incorporate that somehow in information systems. Therefore, culture and language sometimes can present a challenge to computer specialists."

Basic Philosophy of the Class

Learning From the Students

As for the instructor in computer information technology, he can easily state that his best teachers have been his students. With the emphasis on this idea and the constant reminder that he is in the class also to learn, students tend to value this approach by showing a greater desire to learn. Students usually show pride and high confidence in the learning environment once they hear that they are also in the class to convey their thoughts, experiences, and judgment.

Perpetual Knowledge

Lifelong learning is the belief that students learn in the class. Truth is a relative concept and what is considered as a suitable solution today might lose its glamour in the near future. Keeping that in mind, students are encouraged to value learning and avoid becoming obsolete in their reflection on issues and to learn and unlearn ideas on a regular basis. The students are told that the only time people stop to learn is when they cease to breath.

Discussion style

Every student is asked to research the same topic with no more than a single typed page. The references of their finding should be cited using the American Psychological Association's style (APA). The length of the paper provides a student with two main advantages. First, a student must be able to select the most important points related to any topic and still be able to present to the class. Second, the short paper gives other students a chance to present their own findings with the allotted time for the class.

The following comments regarding the discussion style of the class:

1. "The open discussion had its advantages; it made some members of the class open up and voiced their opinions more. Their participation becomes apparent that they were enjoying the class. I even thought that some of the students changed their perspective when they began to read and put thoughts down on paper."
2. "Doing research for each project was entertaining in itself since it required research, reading and having to view different websites to accumulate the needed information."

Non-threatening Environment

The first assignment is to ask the students to indicate, to the best of their ability and on a volunteer basis, their strengths and weaknesses. If a student wishes to share their list with other students, s/he is encouraged to do so. Most students tend not to think about their strengths and weaknesses in clear terms. The students usually take this opportunity to draw a self-analysis on their abilities. To some students, this assignment seems an awkward one. The instructor assures the students that part of this class is to reduce the weak points and accentuate the strong ones. At the end of the class, students tend to revise the list and examine the extent to which they have dealt with their points of limitation.

A relationship between an instructor and a student should be based on trust, genuine feeling, and high level of enthusiasm for learning and accepting guidance. The students should believe that the instructor wants the best possible learning outcome for them. This usually does not go smoothly and different approaches can be applied to resisting students. The instructor may call for individual meetings and support sessions with students who need assurance. Usually the discussion stresses the fact that the students must try their best, to come prepared to the class, and ask any questions, regardless of how they view the questions themselves.

Most students fear public speaking. To deal with this issue is to create a non-judgmental atmosphere. Students are encouraged to discuss their fears about public speaking and to what extent they dislike it. The shared feeling and the acknowledgement that many students resist public speaking help them to realize that they are not alone in their reaction. To alleviate the problem further, the instructor usually shares with students some of the difficulties he has experienced during an earlier time when public speaking was an unpleasant and undesired task.

By the end of the classes, some students provided these comments:

1. "I tend not to speak out and voice my opinions. This class has definitely brought me out of my quiet nature to some extent."
2. "All in all, this class taught me about some of the things about Information Technology I didn't know and also about some of the wisdom I gained about myself I didn't know."

Any Failure Is Welcome

Students are encouraged to examine their failing attempts in a project or arriving at an ineffectual outcome as an opportunity to understand the situation better in order to deal with it effectively in the next attempt. Failure, if it is not a consistent behavior, is viewed as a positive and as a learning tool.

The following comments were stated by the students:

1. "One of the things I learned was to overcome the fear of failure."
2. "Although competence, diligence, and a sense of personal satisfaction are important, negative feelings, such as fear of failure, result...[into] unreachable goals."

Collaborative Learning Is Encouraged

Students are encouraged to work together on special projects. In addition to the weekly assignment, there is a weekly presentation that a student may want to share with the class. This year, students presented interesting topics such spyware, ad-aware, viruses, worms, nanotechnology, and future innovation in the information systems, to name a few. The collaboration helps students work in a team, accept or argue different approaches, and learn new techniques on how to communicate a subject.

The following are some comments by the students' concerning the learning process itself:

1. "As to this class I really enjoyed that I saw improvement in many of my classmates. Some were extremely quiet and at early stage in the class they did not provide much input but as time progressed they came out of their shells and really gained a lot of knowledge."
2. "It helped me to communicate my feeling with 'strangers' and get to know them as persons. I have implemented these communications skills at my place of employment, and I think it has helped me."

No Single Way to Learn

Students are encouraged to present their findings in different media. This gives them the chance to discover their learning style and the degree of comfort with a certain approach vs. another. Some students like to use an abundance of graphics and animation to present their ideas, and other students did exceptionally well verbally.

Administrative Support

The instructor shows that, to instruct a class, there are additional components at FKCC beyond what they see at the classroom. The educational system at FKCC is a friendly and cooperative one. To practice these ideas in the class, the Vice President of Instruction and the Dean of Business and Technology are asked to contribute to the class. The relationship between the Vice President of Instruction and the faculty is a contributing factor to the success or failure of a class. The Dean of Business helps and supports to bring a realistic and innovative input to the class. To draw on his vast experience in the business world has been a great advantage to the students.

Vice President of Instruction.

Students need to realize that in order for any information systems to succeed, the top management in their workplace should support the project. The relationship between a system analyst and a chief information officer should be based on support and understanding. To apply these

concepts to class, the instructor discusses styles of management and leadership with The Vice President of Instruction to bring the value of these discussions to the classroom.

The input of the Vice President of Instruction focuses on the relationship between an administrator and a professor. The Vice President of Instruction's role is accomplished by creating a climate that supports the risk-free attitude of its employees to pursue organizational change through individual and collective pursuit of what is best for the organization.

The following points are made by the Vice President of Instruction to assure the smooth operation of instruction and to provide the necessary support to classes that require a degree of flexibility:

1. Leadership strives to foster understanding, respect, dignity, and a climate of cooperation and freedom to take risks.
2. Leadership works hard at keeping these procedures at a minimum to insure the flexibility necessary to adapt to constant change. It is this factor of change and the ability to adapt to it that ultimately define the continued growth and health of the organization.
3. Leadership's responsibility to provide a meaningful work place to all employees with the opportunity for personal and collective satisfaction and success
4. Leadership through its relationships is built on trust and respect and provide the necessary environment at FKCC to insure that individual professors may pursue projects with their students that are timely and relevant.

Dean of Business and Technology.

The Dean of Business at FKCC has been an integral part of this class for the last five years. Every year this class is taught, he helps by demonstrating to the students that succeeding in the business world involves more than understanding the business and technological processes. The Dean of Business and Technology presents his material in two meetings with the students. At the first meeting, he becomes familiar with the students background by handing out a questionnaire. The questions tend to trigger a reflective and forward thinking process. For example, "What could students do if they have access to an unlimited amount of money?" Another question is to list their priority in life. There are additional questions mostly to trigger critical and creative thinking in the students' evaluation to the immediate period of their life.

Next meeting the Dean of the Business and Technology discusses the students' answers to the questionnaire. The discussion is very revealing and edifying since students have the chance to express themselves. The students also share and hear the other responses and compare them to their own. The discussion finishes with a presentation on "How to Unleash Your Subconscious Creativity." The following items are the highlights of the presentation:

1. Defining creativity
2. Connecting our creative ability to our dreams. If we can dream it, we can do it.
3. Knowing our comfort zone. How much is enough? What are our choices in friends, families, work, salary, and environment? How are we limiting ourselves? Eliminating blocks to creativity by applying affirmations, programming the mind, positive thinking, neuro-linguistic programming, to name a few.
4. The power of negative thoughts and how we control those thoughts

5. Knowing the type of our personal strategy by understanding main representational systems such as auditory, visual or kinesthetic.
6. How to unleash our creativity
7. A call for action on our dreams.

After finishing the presentation, the students are asked to write what they have learned from the discussion and the presentation made by the Dean of the Business. The following are comments regarding the presentation made by the Dean of Business:

1. "One of the questions was 'what I do if I have only six months to live?' My family comes to mind first and the pursuit of inner peace and just finding old friends and reacquainting myself with them. The same thing that I have forgotten and been sidetracked. I have since gotten in touch with many of my old friends, some from as far back as twenty years."
2. "The Dean has showed us that to succeed in using technology effectively, we need to focus on our inner abilities first."
3. "The Dean has showed that creativity and innovation comes from within the human first and then from the machine."
4. "Computers cannot solve every problem."

Conclusion

There is a clear conclusion that building the human component is the most important aspect of designing and implementing information systems. Understanding the relations among the parts of an information system is essential to the success of any information system. However, we need to go beyond the obvious and try to train and foster students who are pursuing a degree in information technology to develop additional concepts and skills to their technical ones. These skills and concepts include information and systems, evolutions of information systems, computer literacy vs. information literacy, critical thinking vs. creative thinking, and finally, outsourcing of information technology and its impact on employment.

This research paper includes basic philosophy about how the instructor taught the class. These subtitles for this section include learning from the students, perpetual knowledge, discussion style, non-threatening environment, a failure is welcome, collaborative learning is encouraged, and finally, no single way to learn.

The paper also discussed the collaboration that takes place between the instructor and the administration. The Vice President of Instruction is asked to help define leadership and provide insight on communication skills. The Dean of Business and Technology presents the value of building communication and provides the class with a presentation on how to effectively program your mind in order to deal with the changes in the business and the technical worlds.

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