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An Examination of Creativity in the Information Systems Curriculum Model and a Proposal for Revision

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Abstract

The importance of creativity in the Information Systems area has been long debated. Creativity has been included in the IS Model Curriculum since 1995. The current IS 2002 Model Curriculum and the IS '97 Model curriculum are compared and contrasted with regard to their inclusion of the topic of creativity. Based on this review, a proposal for a revision to the IS Model Curriculum relative to the role of creativity is presented.

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1. INTRODUCTION

As defined by Evans (1995), "creativity is the ability to discover new relationships, to look at subjects from new perspectives, and to form new combinations from two or more concepts already in the mind". Creativity is important for discovering new ideas and concepts and for developing solutions to new or existing problems. Creativity is also useful when actualizing the new ideas into reality or implementing the solutions developed for specific problems.

The value of creativity and creative problem-solving techniques has been written of by scholars and sages since man first put pen to paper. As George Lois (2003) elegantly stated, "Creativity can solve almost any problem. The creative act, the defeat of habit by originality, overcomes everything." Creativity has been cited as an important factor in product innovation, scientific discovery, as well as art and literature (Evans 1995).

Employers often cite the use of creative problem solving in the workplace as a critical success factor in lines of work such as engineering, management science, medicine, and computer science (Cougar 1995). Another piece of evidence supporting the value of creativity and creative problem-solving in the classroom is that a number of educational curriculum models, such as IS 1997 (Davis et al 1997), include components and learning objectives related to these topics, particularly in the courses related to systems analysis and design. It would appear then that a failure of students to learn and utilize creative problem-solving techniques is a problem that requires correction.

Based on this researcher's experiences in the classroom and other research, it appears that students do not appropriately utilize creative problem-solving techniques when completing class projects or other

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assignments. The questions related to this problem include:

1. Is it actually the case that students fail to adequately utilize appropriate creative problem-solving techniques?

2. If students do fail to utilize such techniques, how can this problem be alleviated?
   2.a. How can students best be instructed in creative problem-solving skills and stimulated to use them?
   2.b.What other factors exist that either enhance or constrain creative problem-solving and how can they be controlled?

With regard to question 1 above, various educational psychology studies have shown deficiencies in pedagogical methods and techniques in the teaching of creative thinking and problem-solving (Postman 1993, Pintrich el al 1993, Alexander et al. 1996). A number of anecdotal accounts from those in the teaching profession, as well as this researcher's personal experiences, also support the claim that inadequacies exist in student's use of creative problem-solving methods, strategies, and techniques. Given that it appears that students are inadequately or inappropriately using these techniques, the next question to be addressed is 'why is this the case?'

The factors that lead to a failure of students to actually use creative problem-solving techniques include that students may lack adequate knowledge of creative problem-solving techniques and how to properly use them. This lack of knowledge may be due to a lack of instruction in these techniques or a failure to instruct in these techniques properly. Also there may be a failure on the student's part to retain what they have learned to the extent necessary to utilize these techniques.

If students are knowledgeable about such techniques and have the ability to use them, they may lack confidence that these techniques can be effective and/or efficient (e.g., they don't work or if they do work they take too long to employ) and are therefore not motivated to use them. Finally, students who are knowledgeable about such techniques and how to use them may not be supported in their use or may even be discouraged from utilizing them by faculty or other students.

The second question to be addressed is how to fix the problem of poor use of creative problem-solving techniques. The approaches to enhancing creativity and the use of creative problem-solving techniques are sometimes categorized as being either internal or external. Lennon (1994) examined senior-level college students who were given instruction in creative problem-solving methods. She found these students had significantly higher application of problem-solving methods and a higher perceived level of effectiveness in field placement settings than students in a control group who were instructed using the traditional open discussion seminar.

Internal approaches are those that focus on the individual, such as providing the individual with information on different creative problem-solving techniques and training on how to appropriately use these techniques. This also includes giving the individual adequate contextual knowledge and experience about the problem area necessary to facilitate the creative process.

The external factors related to enhancing creativity refer to the environment in which the individual exists. External factors include motivators or inhibitors for the student such as sensory factors like light and sound. Other individuals with which the student may interact such as other students, faculty, administrators, etc. may impact their creativity abilities. Providing a classroom environment in which creativity is encouraged and supported is often cited as a key factor in student performance (Ames 1992, Newman and Schwager 1993, Pintrich el al. 1993). John W. Gardner (2003) relates an anecdote to illustrate this idea:

> When Alexander the Great visited Diogenes and asked whether he could do anything for the famed teacher, Diogenes replied: 'Only stand out of my light.' Perhaps some day we shall know how to heighten creativity. Until then, one of the best things we can do for creative men and women is to stand out of their light.

If, as educators, we believe that creativity and creative problem solving are valuable then we have a number of responsibilities. We should know creative problem-solving techniques and concepts, teach them to our students, and encourage students to actually use them. We are further charged with not inhibiting, or discouraging the creativity and creative problem solving of our students, either consciously or unconsciously. Rather we should act to facilitate a creative environment in the classroom and laboratory.

2. LITERATURE REVIEW

Architecture of the Information Systems Curriculum

The IS Curriculum is organized as a hierarchical structure with over 1000 Body of Knowledge elements at the bottom. A Body of Knowledge element consists of an IS curriculum topic to be taught at a particular level of competency. These elements are grouped into approximately 100 Learning Units. Learning Units can be described by their goals, sets of objectives as well as the IS Body of Knowledge elements with their accompanying depth of knowledge levels. Learning Units are in turn grouped into Courses. Currently there are 10 courses defined in the IS '02 Model Curriculum. Finally, Courses are the structural units that implement the five broad Curriculum Presentation Areas, which sit at the highest level of the hierarchy. The Curriculum Presentation Areas are also each divided into Curriculum Sub-Areas.

Creativity in the IS Curriculum Models

Couger (1996) reports that creativity was first explicitly included in the undergraduate IS '95 Model Curriculum although it had been implicitly included in previous reports.

A search of the IS '97 Curriculum Model (IS97) finds creativity mentioned in several locations. In the section entitled 'EXIT CHARACTERISTICS OF INFORMATION SYSTEMS GRADUATES' in Table 2. (p. 12) Representative Capabilities and Knowledge Expected for IS Program Graduates. The first section of this table is labeled 'ANALYTICAL AND CRITICAL THINKING' and it includes the following cells:

Characteristic	With the ability to...	Using the knowledge of...
Problem Solving	• Formulate creative solutions to simple and complex problems	• Creativity techniques

Within the Learning Units defined for the IS curriculum, creativity is referred to a number of times because of the inclusion of creativity concepts in two Body of Knowledge element. The first of these Body of Knowledge elements entitled *'Fostering creativity and opportunity finding*' (reference 2.10.10) is found in the following Learning Units. All of the Learning Units below are shown using the following format:

- **Learning Unit #. Learning Unit Name** (Level of Competency) Curriculum Presentation Area – *Curriculum Sub-Area*

- **8. IT Systems Specification** (Level 3) Systems Development – *Systems Analysis and Design*
- **12. Ethics and the IS Professional** (Level 1) Fundamentals of CIS – *IS Literacy*
- **13.2. Individuals vs Groups** (Level 1) Fundamentals of CIS – *End-User Computing*
- **19. Personal, Cognitive Process** (Level 2) IS Theory – *Decision Making*
- **72. IS Analysis and Design Tasks** (Level 3) Systems Development – *Systems Analysis/Design*
- **86. Interpersonal and Synergistic Solutions** (Level 2) Systems Development – *Terms and Interpersonal Communications*
- **100. IS Application with Programming Language** (Level 3) Information Technology – *Programming* –
- **105. IS Development, Project Planning** (Level 3) Systems Development – *Project Management*

The second of these Body of Knowledge elements entitled *'Optimizing the climate for creativity'* (reference 2.2.15.6) is found in the following Learning Unit:

- **94. IS Development and Project Management** (Level 3) Systems Development – *Project Management*

Creativity is also specifically mentioned in the objectives for Learning Unit 106 entitled IS Development Project Management. The goal of Learning Unit 106 is "to further develop and practice essential project management skills." Its objective is to, "apply meeting design concepts to organizing and conducting effective team and client meetings which ensure shared vision, creativity and empowered actions (LO-0116)". This Learning Unit is part of the Course IS'97.10 – Project Management and Practice.

Creativity in the IS 2002 Model Curriculum

The word 'creativity' is found in several places in the IS 2002 Model Curriculum (IS2002). These are noted below:

In the section entitled 'GUIDING ASSUMPTIONS ABOUT THE INFORMATION SYSTEMS PROFESSION' under item 3. IS professionals must exhibit strong ethical principles and have good interpersonal communication and team skills. Students must understand that IS requires persistence, curiosity, creativity, risk taking, and a tolerance of these abilities in others (p. 7).

In the section entitled 'EXIT CHARACTERISTICS OF INFORMATION SYSTEMS GRADUATES' in Table 2. (p. 14) 'Representative Capabilities and Knowledge Expected for IS Program Graduates'. The first section of this table is labeled 'ANALYTICAL AND CRITICAL THINKING' and it includes the following cells:

Creativity
Creativity concepts
Creativity techniques
The systems approach

IS2002 also contains the same references to creativity in its Body of Knowledge elements that are in the IS97. The Body of Knowledge element numbered 2.2.15.6 "Optimizing the climate for creativity" and 2.10.10 "Fostering creativity and opportunity finding" remain in IS2002.

Differences Between the IS '97 and IS 2002 Model Curricula

Several changes occurred in the presentation of material between the IS97 and IS2002. One major change is that the IS97 Curriculum was released as a printed document whereas IS2002 document was only released via the World Wide Web.

Another major presentation change between the two Curriculum Models is that in IS2002 document, many of the items that were included in the body of IS97 were moved in IS2002 to separate reports, supplemental to the main document. According to Bart Longenecker (2003), one of the authors of both Model Curricula, this was done to make the main IS2002 document more of a static document, while the supplemental reports would be adjusted to reflect changes in the curriculum.

In the IS2002, the section entitled 'GUIDING ASSUMPTIONS ABOUT THE INFORMATION SYSTEMS PROFESSION' was added with a statement that students must understand and tolerate creativity.

As noted above, Table 2. exists in both the IS97 and IS2002 documents although the contents of the table have been revised and reorganized.

3. PROPOSAL FOR MODEL CURRICULUM REVISION

A Proposal for Changing the Importance of Creativity

The importance of creativity in Information Systems is well documented. Creativity is, however, referenced in the Body of Knowledge only as a third tier element (2.10.10) at its highest, and also a forth tier element (2.2.15.6). Given the importance of creativity, a move to a second tier element in the Body of Knowledge is proposed. The inclusion of a Body of Knowledge element numbered 2.5, for example, would signal that this is an extremely important part of the IS curriculum.

The Body of Knowledge report is a hierarchical document, which at its top level consists of the Curriculum Presentation Areas. These are subdivided into Curriculum Sub-Areas that comprise the second tier. A suggested revision to the Body of Knowledge report is to move the topic of creativity from its cur-

rent third and forth tier positions in this hierarchy to a second tier position, which is the level of a Curriculum Sub-Area. For example, creating a new level, 2.5, and completing the hierarchy as follows:
2.5 Creativity in Information Systems
2.5.1 Defining creativity in the context of IS
2.5.2 Methods to enhance individual creativity
2.5.3 Methods to enhance group creativity
2.5.4 Optimizing the climate for creativity
2.5.5 Fostering creativity and opportunity finding

These Body of Knowledge elements must be mapped to appropriate Learning Units. The following is a revision of the current mapping of creativity Body of Knowledge elements to Learning Units.

2.5.1 *Defining creativity in the context of IS*
- **4. Problem Solving, Small IS** (Level 2) Fundamentals of IS – *IS Literacy*

2.5.2 *Methods to enhance individual creativity*
- **19. Personal, Cognitive Process** (Level 2) IS Theory – *Decision Making*

2.5.3 *Methods to enhance group creativity*
- **13.2. Individuals vs Groups** (Level 1) Fundamentals of CIS – *End-User Computing*
- **86. Interpersonal and Synergistic Solutions** (Level 2) Systems Development – *Terms and Interpersonal Communications*

2.5.5 Fostering creativity and opportunity finding
- **8. IT Systems Specification** (Level 3) Systems Development – *Systems Analysis and Design*
- **12. Ethics and the IS Professional** (Level 1) Fundamentals of CIS – *IS Literacy*
- **72. IS Analysis and Design Tasks** (Level 3) Systems Development – *Systems Analysis/Design*
- **100. IS Application with Programming Language** (Level 3) Information Technology – *Programming* –
- **105. IS Development, Project Planning** (Level 3) Systems Development – *Project Management*

2.5.4 *Optimizing the climate for creativity*
- **94. IS Development and Project Management** (Level 3) Systems Development – *Project Management*

The implications of such a proposal are that creativity would assume a much more prominent role in the IS curriculum and, correspondingly, in the IS competency examination currently being developed. Furthermore, enhancing the place of creativity in the IS Model Curriculum ensures that this vitally important topic is not overlooked by those of us charged with developing well rounded IS professionals.

4. CONCLUSION

This paper seeks to spur a national dialog on the importance of creativity in the IS curriculum and its proper place in the Model Curriculum and to encourage more research examining the role of creativity in the IS profession. One direction such research could take is in the development of appropriate exit questions related to creativity for the national IS competency exam.

The primary goal of this paper is, however, a review of material related to the importance of creativity in the Information Systems area and a proposal for a revision of the place of creativity within the IS Model Curriculum. Implementing this revision may lead to greater emphasis on creativity in IS education and result in more creative graduates and IS professionals.

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