

# **A Methodology to Assist Faculty in Developing Successful Approaches for Achieving Learner Centered Information Systems Curriculum Outcomes: Team Based Methods**

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## **ABSTRACT**

All industries face the interrelated challenges of indentifying and training the critical skills needed to be successful in the workplace. Specifically of interest to the information systems field is that any newly trained IS professional has to be equipped to solve increasingly difficult problems with great confidence and competence. In this paper we present the case for IS curriculum implementations (Landry 2008) based on the transformational learner centered methodologies (Saulnier 2008). With this approach, student learners take responsibility for their education and are accountable for the outcomes based on a continuous feedback and self adjustment of goal. We present a methodology for learner centered outcome development by using a template approach developed within a quality process improvement environment. This approach utilizes an existing model curriculum in developing the learner centered attributes. Examples for implementing the approach utilizing team based behaviors are provided.

**Keywords:** Learner Centered Teaching, Curriculum Development, Outcome Assessment, Quality Improvement Process, Team Based Outcomes, Center for Computing Education Research.

### **1. IS2002 SPECIFIES DESIRED OUTCOMES**

Two of the biggest challenges facing any industry are correctly and consistently identifying the knowledge, skills, and abilities (KSAs) needed to perform the job and adequately developing and training its entering members so that they will be prepared with those KSAs that will help ensure success on the job. The field of information systems is not immune to these challenges. One of the major

challenges for the industry at large is properly and consistently equipping students with the skills needed in an industry that deals with rapidly changing problems.

One way that the IS field has dealt with the issue of defining the primary KSAs needed for success is through the IS2002 project. IS2002 (Gorgone et al., 2002) specifies learning units in terms of behavioral outcome statements that learners should know by the time of graduation. The learning units of both IS2002 as well as IS'97 (Davis et al., 1997;

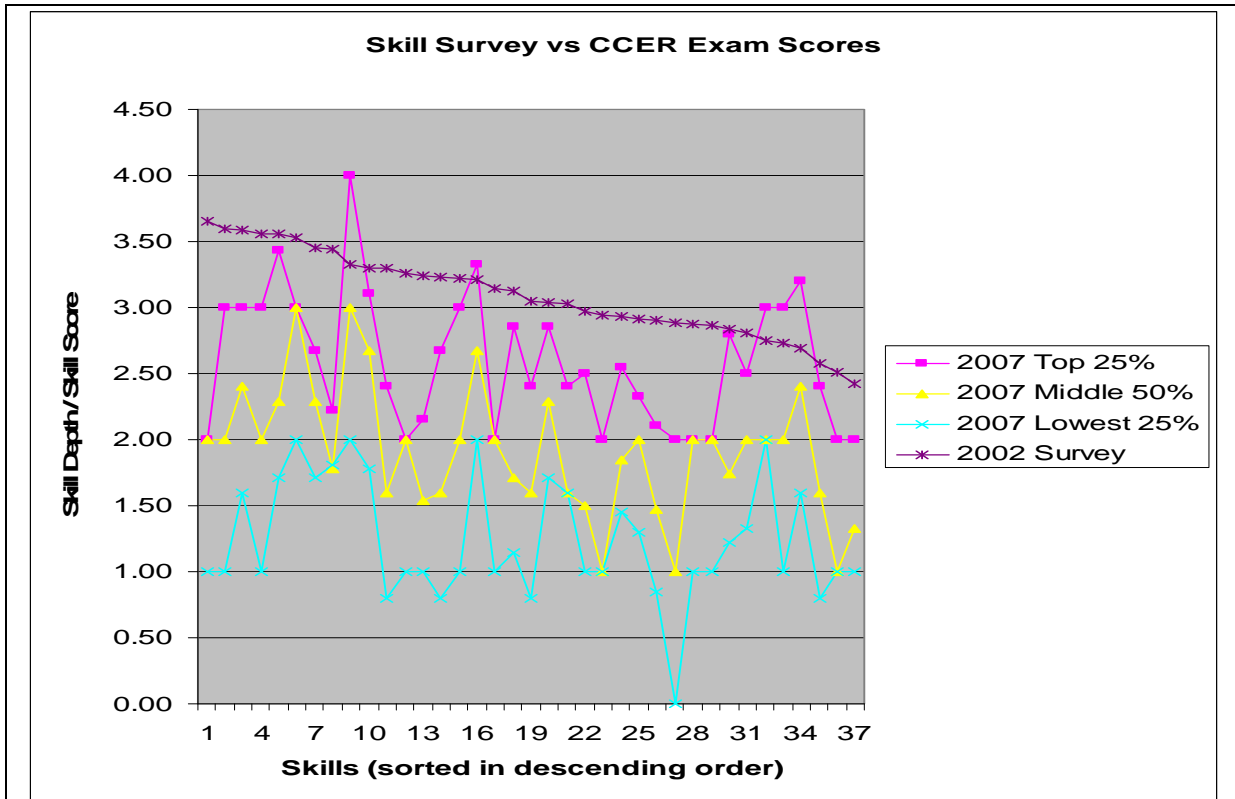


Figure 1. Comparison of Success in achieving Desired Skills.

The top 25% of US Universities who for the most more closely meet skill expectations that were the basis for IS2002. The Middle 25% graph shows the results for the average of US universities; frequently most skills were not fully achieved. The Lowest 25% graph that most expectations are far from met. Skills are plotted in descending order of skill depth for the Expected IS2002 Skill levels (Landry et al., 2007; Colvin 2008). Appendix 1 contains the data shown in this graph.

Couger et al., 1995, 1997) are written behavioral terms, and are explained in terms of the cognitive levels of Bloom’s taxonomy (1956). One of the primary goals that IS2002 was designed to address was to ensure that graduates had sufficient skills to be effective in the workplace (Landry et al., 2000).

The curriculum, as based on IS2002, was designed to enable sufficient time to be allocated to ensure a cognitively paced skill development path, or skill thread. Based on 150 outcome statements, multiple skills were blended within each learning unit to comprise the skill threads need to achieve the desired output skill levels. Landry’s 2000 skill levels were the basis for development of IS2002. Given that those skill levels were found to have insignificant differences from the measurements used to develop IS2002 (Colvin 2007), the learning units were mapped to the identified skills of Landry et al. (2000) demonstrating the skill threads ([www.IS2002.org](http://www.IS2002.org)).

## 2. DEVELOPMENT OF NATIONAL NORM FOR OUTCOMES

Once a definable set of skills for any industry has been identified, the next step is to set the standards of training for

those skills. This is most often achieved through a process of examination and certification. In this way, not only can an industry certify members with minimum levels of skills (McKell et al., 2004). The ICCP grants to anyone passing the ISA exam the right to apply for a distinguished certificate, the Information Systems Analyst Certificate, the ISA (McKell et al., 2005, 2006).

The Center for Computing Education Research (CCER) provides a mechanism for institutions to map the outcomes (Daigle et al., 2004) of their courses to the learning units of IS2002. Therefore, as students of the institution take the ISA exam, the scores on each of the learning units provide a nationally normed direct measure of effectiveness on the 60 learning units as well as on the 37 sub-skills. With this direct assessment (McKell et al., 2007), it is possible for the institution to identify areas of weakness, and work on these areas.

## 3. THE CURRENT SITUATION: TRAINING GAPS

An examination of the data presented in Figure 1 (provided by the CCER Longenecker et al., 2007) suggest that the top quarter of Universities participating in the ISA more closely meet expected sub-skill levels measured by Landry et al.

(2000) and revalidated by Colvin (2008) than do the lower deemed necessary for the job, but also can assess the current state of their members' KSAs and identify critical gaps in training needs.

The Institute for Certification of Computing Professionals through its Education Foundation agreed to sponsor a project to meet this measurement need and develop an exam to test the skills of graduating Information Systems majors (Landry et al., 2003, 2004). The initial exam was developed using subject matter experts made up of a team of faculty and industry professionals. The exam was successful in measuring the competencies of the examinees, but was not designed to specifically map the trainable skills and learning units to actual outcomes. As a result, based on the observation that IS2002 contained skill threads, it was decided to assess 60 higher level learning units in addition to the 37 sub-skills. Because the lower level learning units all mapped into the higher level learning units, it was argued that providing assessment for the higher level units would be sufficient. If traditional non-adaptive testing methods are

employed, in order to provide 4 questions to assess each learning unit and skill a total of 258 questions are required 25%. Although this is not a surprising result, the implication of this data is that although the top performers achieve the skill levels at high rates, the majority do not and represent a gap in skill training.

So, the questions then become, could we do better, and if so, what can we do as a discipline to improve matters? Indeed, even though IS2002 has provided the same guidance to all groups through the learning units, the performance is widely varied. It would seem to be given that faculty would want to have their students do better; therefore, perhaps the real issue is "HOW can the majority of students do better?" We certainly know from famous teachers such as *Jaime Escalante* from the 1988 movie "Stand and Deliver" that students can reach very high levels of performance as a result of the teacher's approach (Jessness 2002). Certainly, it would be desirable to for information systems faculty to explore approaches that could lead to the degree of success of *Jaime Escalante* (Landry et al., 2008).

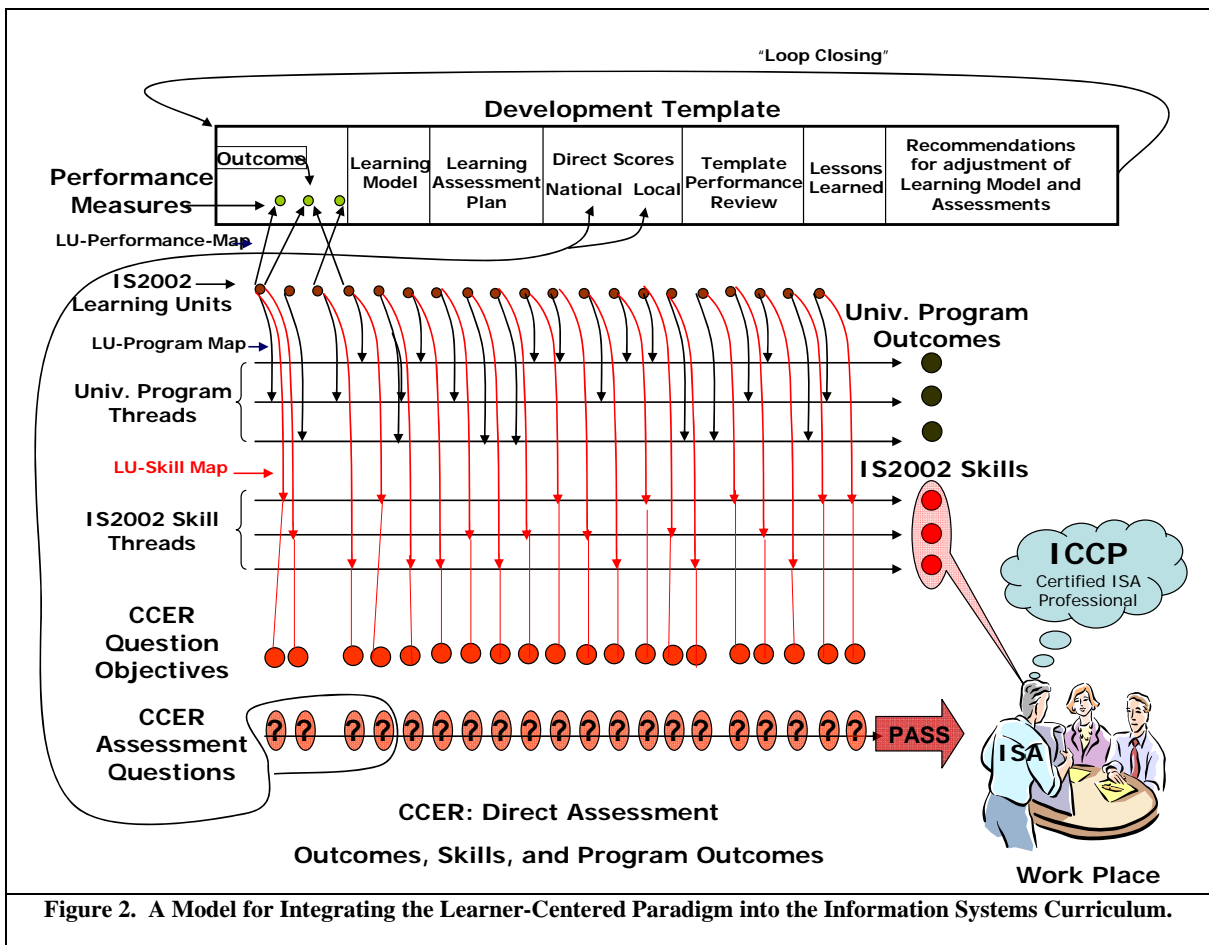


Figure 2. A Model for Integrating the Learner-Centered Paradigm into the Information Systems Curriculum.

4. THE LEARNER-CENTERED PARADIGM

Although IS2002 provides an excellent specification for outcomes, it is silent about methods for achieving success. Indeed success with these complicated training needs is often

difficult. Interestingly, Jessness (2002) explains that it took *Jaime Escalante* a decade to perfect his approach. Not only did his AP Calculus class have to be effective, but the feeder courses also had to be in place and be effective. Regarding the information systems field specifically, Saulnier et al.

(2008) presents a detailed framework for the Learner-Centered paradigm which Landry et al. (2008) argues is profoundly important for IS educators.

One earmark of the Learner-Centered paradigm is that the outcomes must be definable and behaviorally measurable in nature. Figure 2 presents a model for possible course development using a Learner-Centered approach in the IS curriculum. Each behaviorally anchored outcome is preceded by a process. As shown, after the outcome is enumerated in behavioral language, a learner-centered approach needs to be described that is consistent with the paradigm of Saulnier et al. (2008). Assessment plans need to be considered, including the utilization of the CCER ISA exam direct assessment scores mapped to detailed performance measures of the outcome. Following a review process after the course is over, lessons learned are developed, and feedback is generated for the revision of the outcome, learning methods, and if needed, the assessment structure.

As this approach is applied across the curriculum, it would be expected there would be improvement of outcomes. It has been suggested (e.g., Longenecker et al., 2007) that sharing approaches industry wide would enhance the outcomes of the process. Indeed, Pardue et al. (2006) have embraced this approach in his description of a community of practice.

## **5. LEARNING OUTCOME DEVELOPMENT TEMPLATE OVERVIEW**

In the CMMI quality model, it is suggested that improvement in process quality can be obtained by managing the process, using a written methodology, developing process quality metrics and by giving feedback for improvement (Carnegie Mellon University, 2004; CMMI 2002a,b). In order to facilitate a uniform method for development of Learner-Centered outcomes and possible consistency in the implementation of the process throughout the industry, a template structure has been developed which is consistent with the framework of Saulnier (2008). This template is not only based on Saulnier's work, but also on an array of teachings from the field of psychology as well. It is hoped that through the use of a consistent, research based, methodology that the approach will be more widely implemented resulting in fewer training gaps for the industry.

The template consists of 12 steps. Appendix B contains a completed template for the Team Building Skill. References for specific exercises and discussions in the template are provided in the appendix so that the template can be utilized as a standalone module apart from this paper. As one can see, each step is presented with instructions for the user. In addition, the topic discussed, in this case Team Development, in relation to the achievement of other learning outcomes. In the example provided, the complete process is shown with assessment options. However, unlike traditional models, the team assessment rubrics have not been presented, nor have the rubrics for the other outcomes been shown. Rather, a set of measures have been presented for self-inspection/reflection of the developed template with

an additional measure provided that can be used by students and instructors to assess the effectiveness of the outcome.

Throughout the template, empirical findings are presented which ground the assumptions and techniques in research. This is provided to help the user understand why each element is included in the system and which elements are redundant and can be eliminated if time constraints become an issue. Finally, outcomes and results from the use of the template are provided. This allows for a documentation of the linkages between skill sets and behavioral outcomes; thus allowing a more rigorous examination of training gaps.

Although a more complete discussion of the results of the template use are included within the template, in general our findings (utilizing the approach described in Appendix B) were that 1) team maturity increased significantly during the semester in which the method was used, 2) the use of teams to explore other outcomes was uniformly successful and 3) learning outcomes were achieved at a higher rate in courses using this method as compared to traditional teaching styles. These findings lend support to the multifaceted goal of training skills and defining gaps in IS training. As such, although more empirical research should always be performed to constantly assess the effectiveness of the specific templates, these templates and their use in the classroom may provide an effective method for both identifying gaps and training future IS professionals; thus making them more effective in the workplace.

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**Appendix A: Comparison of Desired IS2002 Skills vs. CCER Test Scores Converted from 0 – 100 To 0-4**

#	2002,8 Skill	Top 25%	Mid 50%	Low 25%		Skill Title
1	3.66	2.00	2.00	1.00	2.1.6	Communication-oral, written, multimedia, empathetic listening
2	3.59	3.00	2.00	1.00	1.1.4	Problem Solving-identify problems, systems concepts, creativity
3	3.59	3.00	2.40	1.60	2.1.4	Professionalism-committing to and completing work
4	3.56	3.00	2.00	1.00	3.1.6	Systems Concepts, Use of IT, Customer Service
5	3.56	3.43	2.29	1.71	2.1.5	Teams-team building, vision/mission development, synergy
6	3.53	3.00	3.00	2.00	2.1.1	Learning to learn
7	3.46	2.67	2.29	1.71	2.1.2	Professionalism-self directed, leadership, time mgt
8	3.44	2.22	1.78	1.81	3.1.4	Information Systems Analysis and Design
10	3.33	4.00	3.00	2.00	2.1.7	Ethics-theory/concepts, setting an ethical example
11	3.30	3.11	2.67	1.78	2.2.3	Business Problems and Appropriate Technical Solutions
12	3.30	2.40	1.60	0.80	3.1.7	Systems Theory and Quality Concepts
13	3.26	2.00	2.00	1.00	3.1.3	IT and Organizational Systems
14	3.24	2.15	1.54	1.00	1.3.2	Triggers, Stored Procedures, Audit Controls: Design/Development
15	3.23	2.67	1.60	0.80	3.1.1	Strategic Utilization of Information Technology
16	3.22	3.00	2.00	1.00	1.1.1	Programming-principles, objects, algorithms, modules, testing
17	3.21	3.33	2.67	2.00	1.1.2	Application Development-requirements, specs, developing
18	3.15	2.00	2.00	1.00	1.2.1	Web page Development-HTML, page editors, tools
19	3.12	2.86	1.71	1.14	3.2.1	Team Leading, Project Goal Setting
20	3.04	2.40	1.60	0.80	2.2.1	Learning Business Process and Environment
21	3.04	2.86	2.29	1.71	3.2.3	Coordinate Life Cycle Scheduling and Planning
22	3.03	2.40	1.60	1.60	3.2.5	Project Scheduling and Tracking
23	2.98	2.50	1.50	1.00	3.2.2	Monitor and Direct Resources and Activities
24	2.94	2.00	1.00	1.00	3.1.2	IS Planning
25	2.93	2.55	1.85	1.45	1.3.1	Modeling and design, construction, schema tools, DB Systems
26	2.91	2.33	2.00	1.30	1.1.5	Client Server Software Development
27	2.90	2.11	1.47	0.85	1.2.2	Web programming-thin client, asp, ODBC, CGI, E-commerce
28	2.89	2.00	1.00	0.00	3.1.5	Decision Making
29	2.88	2.00	2.00	1.00	3.2.4	Apply concepts of continuous improvement
30	2.87	2.00	2.00	1.00	2.2.2	Accounting, Distribution, Finance, HR, Marketing, Production
31	2.84	2.80	1.74	1.22	1.1.3	Algorithmic Design, Data, Object and File Structures
32	2.81	2.50	2.00	1.33	1.4.2	Networking (Lan/Wan) and Telecommunications
33	2.75	3.00	2.00	2.00	1.3.3	Administration: security, safety, backup, repairs, replicating
34	2.73	3.00	2.00	1.00	1.4.4	Computer Systems Software-OS fundamentals, resource mgt concepts
35	2.70	3.20	2.40	1.60	1.4.6	Systems Configuration, Operation, Administration
36	2.58	2.40	1.60	0.80	1.4.3	Operating Systems Management-multi platforms/protocols, NT/Unix
37	2.51	2.00	1.00	1.00	1.4.1	Computer Systems Hardware
38	2.43	2.00	1.33	1.00	1.4.5	LAN/WAN Design and Management

Appendix B: Learning Outcome Development Template: Team Development as a Method of Teaching

# Learning Outcome Development Template

## Title: Team Development

### Key Template Conventions

*Instruction – these are instructions for the outcome developer. They may be deleted at any time after the template user understands what is desired in the section. They are not part of the final text. Italic text in the document is a direction to the developer and may be deleted at any time.*

**Structure – Bolded text must be included in the final document. Do not delete! (Bold in used to represent structure in this document)**

Your Text – It is suggested that the outcome developer initially write in some color (e.g. green) other than black to differentiate the work from boiler plate, and then change the initial color green, back to black when done. Note: this text serves as an example to the writer of a new outcome. The writer of the new outcome “clones” the outcome from this text.

*(Note: This is instruction, and this text box may be deleted!)*

*Describe in behavioral terms the desired outcomes to be achieved within the learning sequence of events associated with this template. The learner will be able to:*

**Outcome:** To enable learners to 1) function with minimal intervention as a member of a team exhibiting desirable team characteristics and be capable of working on a highly functional team in solving a presented problem, and 2) integrate these teaming concepts to achieve unrelated learning outcomes

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### B1. Context of the Method

*Explain the goals for this outcome and its normal placement within the curriculum. What problems does it solve? What are special situations that must be overcome in learning achievements? Why does this outcome matter?*

The Team Development Method of Teaching

A primary goal of this outcome is to develop a deep integrated understanding of the processes and functions of teams in an organizational problem solving context. The goal of an understanding of the behaviors inherent in organizational processes can be approached from both individual level behaviors and that of a larger team or department.

A further and more ambitious goal is that students need to not only recall theories dealing with behavior, they also need to be able to apply these behaviors at a deeper more integrated level.

Complicating these learning goals are the fact that most students have never been a member of a functional team such as those teams experienced in the workplace environment. In an effort to facilitate deeper more complete understanding to achieve this learning outcome, the approach attempts to bridge the organizational experience gap shared by most students by developing team fundamentals while simultaneously applying the new found team experience coupled to problem solving experiences to achieve additional and unrelated learning experiences.

### B2. Mapping to National Models

*Cite the IS2002 learning units and skills (<http://iseducation.org> see IS2002 reports). The CCER exams will provide summative direct assessment of these skills and learning units.*

#### B2.1 IS2002 Learning Units

20 Personal, Goals and Decisions  
31 IS Society and Ethics



79 Interpersonal, Consensus Development  
80 Interpersonal, Group Dynamics  
86 Interpersonal, Synergistic Solutions  
87 Interpersonal, Agreements and Commitment  
112 Personal, Proactive, Principled Action  
113 Interpersonal, Empathetic Listening  
114 Interpersonal, Goals, Mission, Alignment  
117 Personal, Presentation  
118 Personal, Life-Long Learning  
121 Personal, Leadership and IS  
126 Personal, Time and Relationship Management

## **B2.2 IS2002 Skills –**

### **B2.2.1 Learning to learn**

Attitude of personal responsibility, journals, learning maps, habits of reading, listening to tapes, attending professional seminars, teaching others

### **B2.2.2 Professionalism-self directed, leadership, time mgt**

Being self-directed and proactive, personal goal setting and leadership, time management, being sensitive to organizational culture and policies

### **B2.2.3 Personal Skills-encouraging, listening, being organized**

Encouraging, listening, negotiating, being persuasive, being organized

### **B2.2.4 Professionalism-committing to and completing work**

Committing to and rigorously completing assignments

### **B2.2.5 Teams-team building, vision/mission development, synergy**

Team building, vision and mission development, planning, synergistic consensus building and problem solving

### **B2.2.6 Communication-oral, written, multimedia, empathetic listening**

Oral, written, and multimedia techniques; communicating in a variety of settings; empathetic listening, principle centered leadership

## **B3. Interactions with Other Outcomes**

*Guidance should be provided to the intended user of these methods to ensure that consideration is given to sequence learning activities. Some prerequisite activity may enhance the learning response thus impacting the achievement rates of the final outcome. Some work likewise can be sequenced almost simultaneously with the learning activities of this outcome. In some cases additional maturity with the newly learned behaviors may be indicated before taking on more complicated work. These issues can be presented in these sections.*

### **B3.1 Prerequisites Outcomes**

There are no prerequisites to this experience

### **B3.2 Can Be Combined With**

This outcome can be combined with almost any learning task that can utilize team work. Coaching on team work simultaneously with other objectives will enhance the overall learning experience. Indeed, it is recommended that one include some exercises designed to enhance team skills during the early activities of new teams.

### **B3.3 Should Proceed**

This outcome should precede work on other outcomes in which advanced team skills are required. Due to the fact that intense team coaching will be distracting, more elaborate team tasks might be delayed for a while to enable teams to start to function at higher levels.

### **B4. Rationale for this Outcome**

*The rationale for the outcome as well as the detail associated with the achievement of the outcome is argued in this section. The literature is cited to focus on the important aspects that should be considered in statement of the outcome, as well as for development of the learning activities and assessment detail.*

This method of team based learning was developed based on research dealing with successful teams in the workplace. The underlying premise of this method is simply that if a successful team structure is fostered that learning and understanding will result at a deeper level.

Using key characteristics of successful teams, a process of team development and self assessment can be utilized to structure the learning environment for all facets of achieving the outcome. In order to illustrate the necessity of each strategy employed, a brief overview of the relevant team concepts emphasized is detailed below. Further each concept is then linked an actual exercise or experience in the classroom designed to employ that very concept. Finally, the overall process is detailed with the resulting learning outcome described.

### **Groups versus Teams**

In order to utilize the team experience to enhance learning outcomes, one must differentiate between the concepts of groups and teams. Further, one must make a distinction between a team and a highly functioning team. In this classroom method the goal is to form highly functional teams, as it is theorized that the learning outcomes would be more desirable if the teams reached the level of the highly functioning variety.

An important distinction for learning under this method was to set up teams rather than simply breaking up students into groups. According to researchers (e.g., Cleland, 1996) several characteristics differentiate groups from teams. Unlike groups, teams are characterized by

- (1) A shared sense of authority and responsibility,
- (2) Shared leadership,
- (3) Both individual and team accountability,
- (4) Shared rewards,
- (5) Working together rather than individually to produce results, and finally
- (6) A high degree of self direction.

These characteristics differ from that of a mere group in that groups tend to rely on one or two leaders, show limited self direction and sharing of responsibility, while at the same time results and rewards tend to be based more on individual effort than a team based whole. In the team based learning method described, it was imperative that teams, not just groups, were developed. Indeed, it is believed that the learning outcomes could not be achieved with group work, but rather could only be realized through teamwork.

### **Characteristics of Successful Teams**

In an effort to allow for the most successful learning outcomes possible, every effort should be made to develop all the characteristics of effective or highly successful teams.

Team researchers have described highly successful teams as those teams who develop commitment to team values, commitment to trust, collaboration among team members, with a meaningful recognition of the importance of rewards (Harari, 1995). Further, successful teams tend to have clearly defined objectives, role clarity, and an open communication style. Finally, it has been found that diverse teams can lead to successful outcomes, if, an awareness of individual differences in conflict styles is achieved (Jehn, Northcraft, & Neale, 1999).

### **Team Development and Formation**

One way to facilitate the creation of a successful team—a key component to the team based learning method—is to utilize team development techniques. These techniques are designed to create an environment by which team members evaluate their own performance and behavior in a dedicated effort to determine both individual and team strengths and weaknesses with the aim of strengthening positive behaviors and mitigating weaknesses (French & Bell, 1978). As described in detail below, this team development through both self and team assessment and awareness is a key component to the learning methods employed in this system.

### **B5. Strategy to Achieve Desired Outcome**

*The purpose of this section will be to describe the sequence of steps that can be taken to achieve the learning outcome. The overview outlines the approach. Because it may be desirable to present a considerable amount of written material to describe tasks and assessment opportunities, the writer is cautioned to remind the user of these materials that not everything has the same weight. Section 5.2 gives the opportunity to express what the primary focus should be on. Assessment of behaviors for the purpose of developing feedback should be clearly separated from grading, and both may be discussed in overview in section 5.3. Finally, in step 5.4 the details of the methodology are presented.*

### **5.1 Overview**

Description of Key Components in the Team Development Method

The team based learning method is based in large part on the above research. Specific components of the method are designed to gain the most benefit from successful teams. The method will be described first in general terms with specific components relating to key team concepts highlighted. It was hypothesized that the development of the highly functional and successful team would create a synergistic effect resulting in a deeper level of understanding and learning than would be experienced by students who were taught using the more traditional, individualistic methods.

In a general sense the method consists of several key components: (1) Team and Self Assessments (2) Directed Communication and team development exercises (3) Team developed contract/goal (4) Team directed tasks and teaching and (5) Team based and individual assessment and

accountability. Each of these components will be explained further as the method specifics are detailed.

### **B5.2 What's Important, What's Not**

It is important to spend adequate up-front time to develop the teams, present and discuss effective team characteristics, acquaint the team with team maturity measurements, and to perform an initial assessment.

Next, it is important to switch focus to working on other important outcomes and completing the contract/agreement process to define and focus work. As the work of the agreement proceeds it is appropriate to give verbal feedback regarding principles of good team behavior as situations present themselves. Other task assessments, regarding other outcomes, can be completed.

Finally, during the middle a 360 team-assessment of team maturity can be completed. A similar assessment can also be done at the end of the semester. It is strongly suggested that the team maturity measures not be used for grading. Grading can be accomplished by a few multiple choice questions given during a final exam.

### **B5.3 Accountability**

Assessment and feedback of team development issues far outweighs the use of sequential information which might be attained for a grade. A team rubric (modified from Smith and Smarkusky, 2002) was used initially to acquaint potential members with desired behaviors. The same instrument is used at mid-semester and at the end of a semester to establish growth in team maturity.

Exam question objectives and sample questions are made available throughout the semester, and may be used as a summative evaluation. Alternatively, significant participation and formative achievements may be used as an alternative scoring device.

### **5.4 Steps of the Approach**

T1 - Team Formulation and Self Assessments

A key component to both the development of the successful team and facilitation of learning outcomes are the self and team assessments. Individual and team based self assessments consisting of several different personality and task based assessments are a key component of this method. Each student should complete several assessments. Assessments should include “team player style” survey (Parker, 1996), color code (Hartman, 2004) self monitoring scale, and conflict style survey. Each of these instruments generates scales which may be used in the formulation of teams and in team development. Each team member not only learns the results of their own personality assessment, but also those of their team members. Team members learn the consequences of interacting with members of different types. In this way teams emphasize strengths and are aware of weaknesses of the team (e.g., French & Bell, 1978).

Five person teams should be formed based on the results of three basic self assessments: 1. Team Player Style, 2. color code and 3.conflict style. The team player style (Parker, 1996) was the primary assessment for team formation.

Team player styles consist of contributors who are primarily task concerned, collaborators who are primarily

goal directed, communicators who are concerned with the process and finally challengers whose role is to question. Research has shown that individuals have a primary type however can take on secondary roles when needed (Parker, 1996). Further that any of the types can take on a leadership role when necessary. This ability to take on leadership roles was important in these teams because, as detailed above, successful teams tend to have multiple leaders.

Teams ideally should be formed consisting at least of one of each primary type. The secondary assessment used for team formation was the color code assessment (Hartman). Members should then be stratified based on color type (i.e., red, yellow, blue, or white) with each color represented in each group.

Finally, conflict style (i.e. aggressive, avoidance, etc.) needs to be assessed during the formation period, and although not a factor in team formation, each team member should be made aware of the each member's respective style. This is done based on the research that diverse teams are more successful when an awareness of conflict styles is achieved (Jehn et al., 1999).

Obviously, in small sections, less than optimal teams sometimes have to be formulated because of lack of numbers and diversity.

#### T2 - Directed Communication and Team Development Exercises

Throughout the semester teams should work together on various projects and experiential exercises. To facilitate communication, teams are to be taught the nominal group technique (e.g., Bartunek & Murringhan, 1984) which mitigates group think and allows a more complete discussion of ideas in the group setting. Additionally, groups should participate in team building exercises that help facilitate cooperation. One such exercise is "win as much as you can" an exercise in which team members learn game theory whereby rewards are only won with cooperation. These exercises facilitate team building by both enhancing communication and creating a sense of shared rewards.

#### T3 - Team Developed Contract/Goal

Each team develops their own "contract" or work-agreement that outlined clear objectives, roles, and rules of behavior for the team. Further each contract should outline the process and procedure for rule violation. In this way teams develop clear roles, goals, and a shared sense of authority and ownership in the team outcomes as is desired in highly functional teams.

#### T4 - Team Directed Tasks and Teaching

In General:

All classroom tasks, with the exception of the exams, can be performed at the team level. Papers, extra credit opportunities, and projects can be given at the team level. Further, roles performed and other time accounting can be detailed as an appendix for each assignment. This allows for individual accountability as well as group based rewards. Also, the use of the group based mini-projects throughout the semester can help the team to further develop cohesion.

Additionally, the main learning goal can be achieved through self directed projects. In this case, teams chose a

topic that related to the course material and developed a comprehensive paper and presentation around that topic. Allowing the team to choose the topic enhances the self directed nature of the team. Teams not only learn the topic in depth for themselves but additionally are required to teach the topic via presentation, exercises, and lecture to the other teams in the class. Teams also create assessment items in the form of question objectives and related multiple choice questions for inclusion on the final exam, which like all exams are taken on an individual basis.

Exemplars:

The following examples relate to the achievement of other outcomes yet are sketched here to illustrate the use of teams in solving the problems. That is, in the same semester wherein team fundamentals are introduced, gaining depth in team knowledge comes about by taking on responsibility for learning and sharing significant results gained through considerable team effort. Incidentally, because the team process is indeed an active process, the exemplar material is learned as well. The amount of learning is consistently and provably higher in this team method as opposed to lecture.

#### Example 1 – Team Development Exercise: Nominal Group Technique

Several different team development exercises can be done to help utilize this approach. Indeed, almost any exercise set up properly can be used to facilitate the team development experience. One particularly effective exercise is detailed below. A key point to using any exercise is the inclusion of the nominal group technique (e.g., Bartunek & Murringhan, 1984) prior to using group development exercises.

The nominal group technique is a process whose primary goal is to prevent the introduction of group think into the decision making process through a directed and controlled offering of opinions by each group member. A general overview of the process is simply that group members write down options, opinions, or ideas pertaining to a specific problem or question *individually*. These ideas are then shared with the group. These simple techniques help to mitigate "group think" because everyone's individual opinion is shared before the group advances in a group motivated direction. By teaching and encouraging this technique prior to any group development exercises, the effectiveness of latter exercises is enhanced.

#### Example 2 – Team Learning Involving Journals, Learning Maps, and Presentations to Learn the Covey Habits and Principle Centered Leadership

All team members are provided an audio recording of one of the Covey Books (The Seven Habits of Highly Effective People, Putting First Things First, and/or Principle Centered Leadership). Using Windows Media Player, students are taught to capture phrases/findings from the material and enter these into a journal. Two other columns of the journal consist of a detailed explanation of the findings and a short abstract of the finding and explanation. First each member builds a journal individually consisting of 40-60 items per hour of material. Then, the team builds a composite journal working together based on each individual's recommendations. The composite journal is

used to build a detailed concept map depicting all of the relationships in the work as a team effort. Finally, the concept map is used in preparing an outline of the material. This outline becomes the basis for a team rehearsed presentation to the group. Assessment multiple choice questions are generated by the team to focus the class on important issues. Initial submission of individual journals for preview by the team and instructor enable immediate feedback and also contribute to the learning experience. In class critique of learning maps and outlines by the instructor and other teams enable rework prior to the team presentation. Each additional contact with the material enhances learning of the exemplar as well as providing a reward to the team for their performance.

#### Example 3 – Developing a Strategic Information Technology Plan

In a graduate level information systems strategy and policy course, a learner-centered approach and teamwork are used to help achieve educational outcomes. Individual and team tasks are intertwined to build student confidence and competence, and to eventually produce high levels of team performance along defined learning outcomes. The five guidelines for “designing assessment tasks to promote learning,” discussed in the Saulnier et al. paper published elsewhere in this issue, are used to describe the learner-centered approach of the course, which culminates in the completion of a team-based IS planning assignment.

The course is begun with personal course goal assignment designed to introduce students to the mission of IS concept (McNurlin and Sprague 2006) which is the basis for the course outcome “*to develop personal and organizational strategies to improve the performance of people in organizations through the use of information technology.*”

The personal course goal assignment helps *focus students on the learning process* (Saulnier et al. guideline 1) by focusing on the outcome itself and its personal and professional importance to them.

Next, a series of three activities are used to further reinforce the concept. First, as the seven strategic IS planning techniques to be used on the IS planning project are covered, each team is required to teach a technique to the class, as a means of practicing performing and presenting as a team using active learning. Second, at the next class period, students take a simple matching quiz to establish whether individuals can differentiate among the techniques. Third, and immediately prior to the mid-term exam, teams compete in a game show style vocabulary tournament. Students practice teamwork in preparing for the tournament and bond through competition with the other teams. The learning experiences leading up to the mid-term exam are designed to *reduce the anxiety and stress of the evaluation experience* (guideline 2).

The mid-term exam is designed, described, and evaluated according to course outcomes which are previously introduced and practiced. Mid-term evaluation *does not use evaluation to accomplish hidden agendas* (guideline 3) but rather prescribed and practiced outcomes familiar to students. It is believed that by the conclusion of the mid-term exam, an individual’s knowledge and skills are

further reinforced and students well-prepared for the team project activities. In this way, the mid-term serves as a build-up to the team activity by providing learning along the same set of outcomes.

The major assignment for the course is a semester team project to develop a strategic IS plan for a real or imaginary organization, chosen by the team so that their learning may be self-directed. They were assigned to work in teams, consisting of a balance between MBA and MIS students. They turn in a report with executive summary, body, and glossary, and make a presentation. By the time this assignment is given the prior activities should have succeeded preparing them by following guidelines 1-3: focusing students on learning, reducing evaluation anxiety, and freeing evaluation from hidden agendas.

Students are further prepared through the strategic planning crash assignment, completed in one class period. They are provided a spreadsheet with examples of past student projects and are instructed to work through their own planning problem rather quickly and superficially from mission → business situation → use of planning techniques → business strategy → IS mission → IS strategy → a project idea. They produce a row in the student examples spreadsheet which was then reviewed by both the instructor and the class. This allows for timely feedback thus reducing procrastination and misunderstanding of goals (*incorporating a formative feedback mechanism* guideline 4).

The remainder of the project further uses formative feedback though the evaluation of multiple drafts. An outcomes-based grading template is used to provide written feedback and nonbinding preliminary grades. Each team serves as a discussant group for another team. The discussant group gives each team practice in the role of the audience (CEO/CIO), provides a self-reflective opportunity for teams, and provides valuable feedback for their peers. The use of the three or more drafts with written feedback, discussant review, and preliminary scoring further serve as formative feedback mechanisms designed to reduce evaluation stress and anxiety, and focus all teams on learning, rather than the evaluation.

#### **B6. Assessment Concepts**

*Each performance measure associated with assessment of the relevant components of the outcome statement should be identified, and the mechanism for assessment should be presented. If rubrics are to be used, then they should be named. If exam question are to be used to assess (not grade!) the attainment of a component the set of objectives should be identified as well. See the planning summary below for an example.*

#### **B7. Exam Objectives**

*For each exam group whether the exam is used for assessment or grading, specify in behavioral terms a set of question objectives that cover the material to be evaluated with the exam, Make certain that later questions developed are 100% consistent with these objectives to ensure trust with the learning community. If you like, you may also write a set of objectives for the goals to be covered in new rubrics as well.*

Team Maturity Group (questions with respect to the Smith and Smarkusky (2002) assessment)

Identify which behaviors represent more mature team behavior

Determine which behaviors correspond to each of the major team metrics

Identify which strategy would assist a team mate in achieving increased team maturity

Contract Characteristics Group

Identify the sections of a team contract

Formulate the rationale to ensure team participation

Isolate faults in a team contract that might lead to poor behavior

Repair faults in a team contract to increase likelihood of performance

Develop a rubric to assess the performance of team contract performance

Team vs. Group Objectives

Recognize and explain team behaviors

Recognize which behaviors do/do not characterize a group

Express limitations of a group not shared by a team

### **B8. Supporting Materials**

*It is important to formulate a list of all materials necessary to furnish (by the instructor or by the team) without which it will be difficult to accomplish the team projects.*

No special materials are required

### **B9. Pilot Observations**

*Please complete sections 11 and 12 below. Then, file pilot observations for this release of the document here. It is necessary only to generate new material here when there are substantial changes to the document. Be descriptive of observations of success or failure.*

Initially, it was hypothesized that the directed, specific development of highly functioning teams would result in a deeper learning and higher understanding of organizational behavior concepts. Happily both the quantitative and qualitative outcomes bear this out to be the case in separate instances for each of the authors.

From a qualitative standpoint, the classroom discussion and application in the four sections utilizing this method were superior to typical classroom discussions experienced using traditional methods of instruction. Namely, students were more likely to apply the concepts to their own experiences, seek out additional information beyond that assigned, and express interest in pursuing the topic via independent studies or further research opportunities. In addition, presentations on team chosen topics were in much richer in depth than those typically given either by instructors or students. Finally, the questions provided by the students assessed a deeper level of knowledge, often applied or integrative in nature, than ones typically written by the instructor. From a quantitative standpoint, students scored significantly better on items—even though more difficult—than they scored on items assessing material from the traditional lecture.

Although it would be beneficial to conduct further research on this method, preliminary results using several hundred students in these team building samples suggests that both qualitatively and quantitatively, that the development and facilitation of self directed, highly functioning teams has the benefit of creating an environment that supports consistently higher level learning outcomes.

### **B10. Section References**

- Bartunek, J. M. & Murringham, J. K. (1984), The Nominal Group Technique: Expanding the Basic Procedure and Underlying Assumptions. *Group & Organization Management, Vol. 9*, 417-432.
- Cleland, D. I. (1996), *Strategic Management of Teams*. New York: Wiley.
- French, W., & Bell, C. (1978). *Organizational development. Behavioral science interventions for organizational improvement*. Englewood Cliffs, N.J. Prentice Hall
- Harari, O. (1995), The Dream Team. *Management Review*, 84, 29-31.
- Jehn, K. A., Northcraft, G. B. & M. A. Neale (1999), Why Differences Make a Difference: A Field Study of Diversity, Conflict, and Performance in Workgroups. *Administrative Science Quarterly*, 44, 741-763.
- Parker, G. M. (1996), *Team player and teamwork*. San Francisco: Jossey-Bass, 63-86.

### 11. Planning Summary

The instructor should be able to use this form as a checklist for planning and reviewing a well developed outcome.

<b>Planning Summary: a Learner Centered Approach</b>		<b>Instructor:</b> Teresa A. Wagner	
<b>Outcome:</b> <i>expressed in behavioral terms</i>	To enable learners to 1) function with minimal intervention as a member of a team exhibiting desirable team characteristics and be capable of working on a highly functional team in solving a presented problem, and 2) integrate these teaming concepts to achieve unrelated learning outcomes		
<b>Approach:</b> <i>discuss briefly the sequence of learning tasks that will lead step by step to the desired outcome</i>	<b>Task:</b> <i>a step by step break-down revealing all tasks each known to promote learning that are to be used to lead to the desired outcome.</i>		
	(1) Team And Self Assessments (2) Directed Communication And Team Development Exercises (3) Team Developed Contract/Goal (4) Team Directed Tasks And Teaching, And (5) Team Based And Individual Assessment And Accountability		
<b>Evaluation Methods</b>	<b>Explanation:</b> <i>explain purpose of evaluation instrument to be used; identify performance criteria to be evaluated</i>		<b>Instrument Name</b>
<b>Performance Measure</b>		<b>Rubric or Exam</b>	<b>Rubric or Exam Group Name</b>
Dimensions of the Personality Instruments and Scales should be known, and the connotations of interaction with members of other types should be explained		R	Personality Scales Rubric
Given the Team Maturity Metric, students should recognize and score higher at the end of the semester than at the beginning.		R	Team Maturity Rubric
The components of a team contract should be identified and the meaning should be very clear to all members		E	Contract Characteristics Group
Team members should know what makes a group different from a team, and should be able to answer questions given objectives		E	Team vs Group Objectives
<b>Evaluation of Learning and Assessment Approaches:</b> <i>In planning learning activities, evaluations and exams, each of the following characteristics should be considered to optimize learning--</i>		<b>Scoring Scale</b> 4 – Always 3 – Almost Always 2 – Sometimes 1 – Rarely <b>Pre-Eval      Post-Eval</b>	
<b>Valid</b> – useful information was presented to students to guide learning		<b>Post Activity Evaluation:</b> <i>At the conclusion of the learning activity, consideration of each of the factors may indicate some need for improvement. Indicate the nature of the improvement based on the characteristics described--</i>	
<b>Coherent</b> – the prescribed learning approach lead successfully to the desired outcome			
<b>Authentic</b> – problems / issues were detected and resolved in a timely manner			
<b>Rigorous</b> – standards were clear; facts, procedural and cognitive knowledge was clear and worthy			
<b>Engaging</b> – provoked student interest and persistence			
<b>Challenging</b> – provokes as well as evaluates student learning			
<b>Respectful</b> – allows for student uniqueness as learners			
<b>Responsible</b> – provides feedback to students leading to improvement			
<b>Retention</b> – there is a provable perception of learning that engenders a desire to continue and excel			
<b>Stress Reduced</b> – exams were clearly related to material and authentic samples were provided			
<b>ReDo</b> – Opportunities were provided for either pre-submission review, or redo materials without penalty			

## 12. Review

Use this form to personally review your performance, and/or give it to the students to find out their view.

<b>Reviewing: A Learner Centered Approach</b>		<b>Scoring Scale</b>
		<b>Always</b> <b>4</b> <b>Almost Always</b> <b>3</b> <b>Sometimes</b> <b>2</b> <b>Rarely</b> <b>1</b>
<b>Outcome:</b> <i>Please review the outcome and evaluate the learning degree of success you have experienced</i>	to enable learners to 1) function with minimal intervention as a member of a team exhibiting desirable team characteristics and be capable of working on a highly functional team in solving a presented problem, and 2) integrate these teaming concepts to achieve unrelated learning outcomes	
<b>Tasks:</b> <i>Please evaluate the level of success of these tasks in leading to successful attainment of the desired outcome</i>	(1) Team And Self Assessments (2) Directed Communication And Team Development Exercises (3) Team Developed Contract/Goal (4) Team Directed Tasks And Teaching, And (5) Team Based And Individual Assessment And Accountability	
<b>Learning Analysis:</b> <i>Please Evaluate each of the factors below using the Scoring Scale Shown Above</i>		
<b>Reduce Stress of Evaluation:</b>		
1. Have students been informed and prepared for learning and evaluation experiences		
2. Were sample bona-fide exam questions shown, and were there no surprises on the exams		
3. Was student confidence built during the learning, evaluation, and exam process		
4. Were samples of expected work provided		
5. Were ample opportunities for pre-submission evaluation, or for “redo” of work submitted provided		
<b>Exams and Evaluations:</b>		
6. Challenging, stimulating and fair exams and evaluations were used and reflected well on the effort spent		
7. Rigor and standards were set, maintained, and reflected in exams and evaluations		
8. In class and homework experiences provided time to achieve application and cognitive knowledge and skills		
<b>Feedback Mechanisms:</b>		
9. Grading was separated from feedback on learning activity results		
10. Grading was fair and appropriate		
11. A reasonable amount of feedback was provided: not too much or too little		
12. Feedback was timely and occurred when needed		
13. Feedback, both verbal and written enabled me know what could have been improved		
<b>Learning and Assessment Approach was perceived as:</b>		
14. <b>Valid</b> – useful information was presented to students to facilitate and guide learning		
15. <b>Coherent</b> – the prescribed learning approach lead to the desired outcome		
16. <b>Authentic</b> – problems / issues were detected and resolved in a timely manner		
17. <b>Rigorous</b> – standards, facts, procedural and cognitive knowledge were clear and worthy		
18. <b>Engaging</b> – provoked student interest and intrinsically motivated persistence		
19. <b>Challenging</b> – provokes as well as evaluates student learning		
20. <b>Respectful</b> – allows for student uniqueness as learners		
21. <b>Responsive</b> – provides feedback, verbal and written, to enable student improvement		



### **STATEMENT OF PEER REVIEW INTEGRITY**

All papers published in the Journal of Information Systems Education have undergone rigorous peer review. This includes an initial editor screening and double-blind refereeing by three or more expert referees.

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