

Art Meets MIS: Using the "Master Class" Model to Teach Systems Analysis and Design

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Abstract

Systems analysis and design is a fundamental area in MIS curriculums, and analysis and design courses may have many goals. Such courses focus on methods for systems analysis and design, but are also usually designed to develop students' overall abilities to think and work as good analysts. This paper describes structuring activities in a systems analysis design course like a "master class" in art or music, and the importance of trust building in effective use of the "master class" model. A literature review, along with preliminary observations and student feedback after use of the model, suggest this model has a number of benefits for teaching analysis and design. Benefits include a teacher's ability to better understand student thought processes, and thus give better feedback to the student, an opportunity for instructors to model systems thinking, and a chance for students to learn how to give and receive critique.

Keywords: systems analysis and design, feedback, trust

1. INTRODUCTION

In the curriculum for management information systems at Luther College, Systems Analysis and Design, is a sophomore-level course introducing methods for systems analysis and design. In particular, students learn to create artifacts of the analysis and design process such as statements of work, drafts of requirements, use cases, process models, data models, and user interface designs. More importantly, though, the goal is to develop students' abilities to think and work as good analysts. This requires focus on traditional analysis and design skills, as well as attention to developing students' writing skills for documentation and artifacts of the system development life cycle.

In first teaching the course, the instructor used the traditional method of assigning work to students and grading the products. Students would complete a problem on the given material, which the instructor returned with written feedback and a grade. Students would then complete a second assignment over the material in order to learn from the

feedback on the first assignment. In comparing the quality of the work from the first and second assignments, the instructor often did not see the desired improvement. Subsequently, the instructor attempted to modify the process by having students focus on revising the first assignment based on written feedback to see if staying with one example helped students better learn the concepts using the given feedback. The instructor continued to be disappointed with the overall quality of student learning, as assessed through the artifacts created in the analysis and design process.

The traditional process of having students turn in assignments and grading them in isolation, giving only written feedback poses a number of problems. First, it is difficult to give the depth of feedback students need. For example, in order to improve student writing, attention needs to be given to audience, organization, sentence structure, and grammar. Addressing all those issues in a way that will truly transform a student's writing, particularly a weak student's writing, is challenging using only written feedback. Second, in system modeling, if a stu-

dent's overall approach is misguided, written feedback seems inadequate to capture the types of changes the student needs to make in order to create a better model. Knowing exactly where the student went off track is difficult when looking only at the output of his/her thinking – the completed assignment. Written feedback does not adequately capture an instructor's thinking processes, which is a missed opportunity to model analytical and systems thinking for students.

Good systems analysis and design requires critical thinking and problem-solving skills. Therefore, developing students' abilities as analysts requires more intervention in the thinking process. Viewing completed artifacts does not allow the instructor to understand a student's thinking process. Written feedback does not allow the interaction necessary to question a student's problem-solving process and provide feedback targeted at that thought process. Dynamic interaction can alter student thinking, thus altering the final solution or artifact a student develops.

Drawing on the examples of "master classes" from music and art, the instructor altered the class structure to focus on in-class, oral review of student work. This model was intended to increase the depth of feedback given to students, to provide the interaction necessary to understand students' thought processes and provide feedback targeted at those processes, to identify areas where students needed clarification of material presented, and to model analytical and system thinking skills for students.

2. LITERATURE REVIEW

Master Class Model

A master class model is commonly used in music and other fine arts settings. The structure of a master class includes some performance by an individual, which is followed by critique from the "master" and others in the group (Duffield, 2005). The critique is used to identify areas for improvement and focus for further practice. This structure provides for interaction between the student and instructor and encourages reflection on the process of creating or performing (Davis, 2005). The focus is not evaluation of the work as good or bad specifically, but reflection on the learning process (Davis, 2005). Such a critique can

be more dynamic than written feedback, allowing teachers to ask questions regarding students' thinking and allowing students to respond to feedback (Soep, 2005). The feedback provided is the basis for revision and ideally improvement of the work (Davis, 2005).

The dynamic interaction of the master class model allows teachers to more clearly identify the mental models students use in their thinking about a subject. Individuals build mental models for understanding the world based on their experience in the world (Bain, 2004). Those models influence the way students interpret new information (Bain, 2004; Filene, 2005). As a teacher uncovers the mental models students are using to assimilate new material, the teacher can modify presentation of material to meet students where they are intellectually. This interaction and understanding of student thinking processes is key for teachers attempting to help students improve analysis skills and quality of student work done in the analysis process.

The master class model provides other benefits as well. It is a model that demonstrates the value of collaboration and getting multiple perspectives on a project (Davis, 2005). The teacher has a chance to model behaviors and ways of thinking for students (Davis, 2005; Duffield, 2005). Teachers can demonstrate the attention to detail, listening skills, and ways of framing questions required for good analysis (Davis, 2005). Students have an opportunity to participate more fully in their own learning process and to improve their ability to judge the quality of the work (Soep, 2005). When students have an opportunity to speak about their work or discuss the work of others, they invest more in the process and take away more (Filene, 2005).

Role of Trust

While the master class model presents an excellent learning opportunity, it also requires that teachers create a safe environment where students are not fearful of the process (Davis, 2005). Trust can be a key element in creating a safe environment where students can engage in the critique process. Trust is the idea that the trustor is taking some risk in the interaction with the other party (Sztompka, 1999). In the case of the oral feedback model, students seem

to fear being embarrassed or humiliated in front of their peers.

Trust creates a positive working environment that allows for honest and supportive relationships, is conducive to cooperation and the maximization of the creative potential of individuals, and has less conflict (Bijlsma & van de Bunt, 2003; Costa, Roe, & Taillieu, 2001; den Hartog, 2003; Diffie-Couch, 1984; Hardin, 2002; Hoy & Tschannen-Moran, 1999; Tyler, 2003; Urquhart, 2003). Trust promotes open exchange of information and ideas, and makes individuals more willing to listen and accept criticism without being defensive (Abrams, Cross, Lesser, & Levin, 2003; Bartolome, 1989; Hoy, Sabo, & Barnes, 1996; McBride & Skau, 1995; Mishra & Morrissey, 1990; Tschannen-Moran & Hoy, 2000; Tyler, 1998). In high trust environments, the quality and quantity of information exchanged is greater, and individuals are willing to be more candid about differences (Diffie-Couch, 1984; Hoy, Sabo, & Barnes, 1996; McBride & Skau, 1995; Mishra, 1996; Mishra & Morrissey, 1990). Trust allows the exchange and openness needed to effectively use the master class model.

Trust develops as parties interact and there is rational evidence of trustworthiness of the parties involved (Costigan, Ilter, & Berman, 1998; McKnight, Cummings, & Chervany, 1998). Instructors may demonstrate trustworthiness through a variety of behaviors. Trust is enhanced when potential trustees display competence, consistency of words and actions over time, open communication, support of subordinates, benevolence, fairness, and some delegation of control for subordinates (Bartolome, 1989; Butler, 1991; Mayer, Davis, & Schoorman, 1995).

3. METHODS

Using the Model for Class

Students are asked to read the relevant text material before class and be prepared to discuss it. The topic is presented with lecture, discussion, and examples of the main concepts, terminology, and approach. For example, in entity-relationship modeling, students will have read the relevant material, and a class period is used to cover main ideas such as entities and attributes and to do small examples illustrating new concepts.

Students are then assigned to create a draft of a relevant artifact for the next class, given a case/scenario. Typical artifacts this method is used on include, statements of work, drafts of requirements, feasibility analyses, process diagrams, ER diagrams, and interface designs. At the beginning of the next class period, two students' assignments are collected for review and critique during that class. Students are not told ahead of time whose work will be presented so each individual must be prepared for each class period. Though the selection of work for presentation on a given day is "random," the instructor is intentional about insuring each student has multiple chances to have their work reviewed by the group during the semester.

The student who is presenting his/her work is asked to give a brief overview of his/her approach and overall work. The instructor and other students are then free to ask questions and make comments. Inevitably, questions come up regarding the theoretical approach and principles that are supposed to be used. This provides an opportunity for the instructor to review and clarify material as needed. When the critique seems to naturally wrap up, or time allotted is reached, the instructor finishes with a summary of what was positive, what needs work, and what can be learned on that particular student's assignment.

The second student is then asked to present his/her work in the same format. For the second assignment, again material is clarified as needed, but the focus is on comparison. How were the two students' approaches the same or different? Given different samples of work can we evaluate which is better, or what things do we want to take from each sample to use going forward?

After this discussion in class, all students are given an opportunity to revise their assignments before turning them in to be graded.

Building Trust

As discussed in the literature review, trust is fundamental to effectively giving and receiving critique and is developed through a history of interactions between individuals. The instructor is intentional about class interactions in order to help build trust among the group. To start, when the students are given the first assignment to be reviewed by

the group, the instructor explains the group critique process. The instructor talks briefly about the mechanics of the process, but then focuses on goals of the process, including learning analysis and questioning skills, as well as the ability to give and take constructive critique. Ground rules for the critique process are shared with students. The rules include not personalizing comments, focusing on both positive and negative aspects of the work, and accepting that mistakes and misunderstandings of material are part of the process. The instructor makes clear that feedback is to be constructive, and that he/she will insure students and their work are treated respectfully.

As the trust literature states, trustees need to demonstrate competence, benevolence and consistency in words and actions. After the ground rules have been set, the instructor's job is to model constructive feedback and tolerance of mistakes or wrong approaches. Modeling these behaviors and monitoring the group interaction demonstrates consistency in the instructor's words (goals for the process and ground rules) and actions. In addition to ground rules and modeling, the instructor regularly does quick oral check-ins with students to see how students feel about safety and helpfulness of the process after their work has been critiqued. Such check-ins are demonstrate concern and respect for students, which further builds trust.

4. DISCUSSION

The oral feedback structure with an intentional emphasis on trust building has been used for two semesters. The class size in each of those semesters was nine students. Based on classroom observation, evaluation of student work, and written evaluations from students, the instructor has identified a number of benefits of the structure.

The benefits observed include:

1. Students seem to better understand analysis and design concepts and later iterations of their analysis and design artifacts and writing are of higher quality than before the class focused on oral feedback.
2. Students appear more motivated to prepare for class, knowing their work may be put up in front of everyone for critique. Some healthy competition also forms with

students wanting to demonstrate their abilities to classmates, thus increasing overall quality of work done by the class.

3. As an instructor there is an opportunity to ask students questions and get more information about their thinking processes. This helps identify areas where students need more help or didn't grasp the material as originally presented. This provides an opportunity for the instructor to uncover some of the mental models or experiences students are using as the basis for assimilating new information, which gives the instructor insight into reaching students where they are and getting them on track. Additionally, the instructor is able to intervene in the student thought process and redirect the thinking before a final product is created.

4. The dynamic interaction allows instructors to give more targeted, richer feedback to students.

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6. Students get feedback not focused on what was done incorrectly, but instead on how the work could be improved. This seems to motivate students to want to revise and improve work rather than turning in an assignment "just to be done," and moving on to the next thing.

7. Students learn the value of being open to criticism. This is also an opportunity to teach students the importance of being willing to admit they don't know or understand something, or that they have made a mistake.

8. The instructor has an opportunity to model constructive criticism for students. It's a chance to model open-mindedness, willingness to search for common understanding, and the importance of being both honest when there are problems as well as supportive and encouraging of improvement.

9. Over time, students acknowledge gaining self-confidence in presenting their work. They cite a better ability to both give and take critique. Both of these benefits seem to ultimately improve quality of teamwork by making students less afraid to voice their own ideas and to acknowledge conflicting ideas or opinions.

10. Students better understand the iterative nature of analysis and design. They

understand that analysis and design work isn't simple "done" in a project and then the project moves on. Instead, there is often revision as points are clarified, clients are consulted, and holes are found.

11. Students gain more comfort with ambiguity. As a sophomore level course, students in this analysis and design course often come in with the expectation that there is a "right" answer. Continual comparison of different students' work allows students to accept there is no single right answer to most problems.

12. Students improve their ability to evaluate quality of work. By comparing work of different individuals, students are able to see that even though there may be more than one right answer, some answers are better than others.

13. Students get a chance to see the level of work being done by their classmates, which can help them see how and why grades earned vary.

14. Students are continually required to present their work and explain their thinking. This improves students' communication skills and mirrors the demands of daily work life for a systems analyst.

5. CONCLUSIONS & FUTURE RESEARCH

Experimentation with the "master class" model indicates the model may be helpful in teaching systems analysis and design. The structure allows dynamic interaction among teachers and students, which enables teachers to better understand student thought processes and to give richer, more targeted feedback. The process encourages revision and improvement of work. Effective use of this oral critique method requires an environment that is supportive of students and conducive to open exchange of ideas. Building trust can be a significant factor in creating such an environment.

While the literature and initial experimentation with the master class model suggest its promise as a teaching method for systems analysis and design, more formal assessment of the model is required. This paper describes the experiences of two semesters using this model, but preliminary findings are based on instructor observation and students' written evaluations, and the class size in each semester was only nine students.

Further research should focus on creation and administration of an instrument to provide empirical support for this teaching method, ideally involving a greater number of students. Additionally the role of trust in effectively supporting use of the master class model should be measured.

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