Student collaboration as the foundation for learning BIM software: Ideas from a project-based introduction

Christopher Monson, RA
Mississippi State University
cmonson@caad.msstate.edu

buildingSMART Alliance Conference
BIM Academic Symposium 11 January 2013
Students work through embedded assessment activities designed to:
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- open students up to the value of working with their peers
- direct the development of collaborative relationships that foster project progress
- institute resource management structures across the class that build construction knowledge as well as the applied skills of Revit
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“impossible problems”
to show students the benefits of and demands for collaborative practices in BIM

if students learn BIM software as a function of shared and collaborative thinking, they are more likely to fully realize BIM’s capacity for integrated practice in more complex content realms later in the curriculum
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Large group work
“just try to get it done” was inadequate

Large group work
An Overview of Project Management

The Steps in Managing a Project

The actual steps to manage a project are straightforward. Accomplishing them may not be. The model in Figure 1-4 illustrates the steps.

Figure 1-4. The steps in managing a project.

```
Define the Problem

Develop Solution Options

Plan the Project
   What must be done?
   Who will do it?
   How will it be done?
   When must it be done?
   How much will it cost?
   What do we need to do it?

Execute the Plan

Monitor & Control Progress
   Are we on target?
   If not, what must be done?
   Should the plan be changed?

Close Project
   What was done well?
   What should be improved?
   What else did we learn?
```

“just try to get it done” was inadequate

a simple six-point management strategy

Large group work
“just try to get it done” was inadequate

a simple six-point management strategy

methods of axonometric and perspective sketching

hand drafted orthographic drawings

Large group work
Teammate’s Name  COLUMN A  My Name  Wednesday, 19 September

Specific things learned from my teammate:

Specific things I think I taught my teammate:

Specific successes my teammate brought our project:

Ongoing issues to resolve between us (identify and discuss):

Teamwork
Decision making
Time spent
Dependability
Quality of work
Quality of thought

OVERALL EVALUATION of my teammate

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<tr>
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<th>Teamwork</th>
<th>Decision making</th>
<th>Time spent</th>
<th>Dependability</th>
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collaborations can be organized through management strategies

student work can be assessed fairly and productively by peers

building assembly content can be accessed and learned through group activities
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**Peer assessment**

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collaborations can be organized through management strategies

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building assembly content can be accessed and learned through group activities
Completed as-built documentation
“Why is teamwork hard?”

“Why are tasks hard to plan?”

“Why is the quality of outcomes hard to control?”

“Why is a group hard to manage?”

Completed as-built documentation
the point was to expose how collaboration works

“Why is teamwork hard?”
“Why are tasks hard to plan?”
“Why is the quality of outcomes hard to control?”
“Why is a group hard to manage?”

Completed as-built documentation
Specific locations for wall sections
Peer resources and assessment
Collaborative outcomes

students have to reflect on the accomplishments of other people's work that is parallel to their own work. They need to recognize the skill sets and knowledge bases across their peer group. They have to recognize and integrate the reflective assessments of others in their own understanding of their own work.
students have to reflect on the accomplishments of other people’s work that is parallel to their own

student have to recognize and integrate the reflective assessments of others in their own understanding of their own work

students recognize the skill sets and knowledge bases across their peer resources

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Collaborative outcomes
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students recognize the skill sets and knowledge bases across their peer resources

“ongoing communication”
“willing participation”
“brainstorming and teamwork”
“trust”
“diversity with mutual respect”

Dan Sanker  Collaborate! The Art of We
Collaborative assessment and development
**Collaborative assessment and development**

**In Class – Review of isometric section**

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<th>More complete than average</th>
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<tbody>
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<td>Foundation</td>
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<td>Slab—drawn correctly</td>
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<td>Slab—hidden lines</td>
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<tr>
<td>Substructure—fills correctly used</td>
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<tr>
<td>Correct isometric angle to substructure</td>
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<tr>
<td>Wall connections to foundation</td>
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<tr>
<td>Wall—elements drawn correctly</td>
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<tr>
<td>Wall cladding</td>
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<tr>
<td>Wall—interior surfaces drawn</td>
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<td>Window/door—elements drawn correctly</td>
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<td>Window/door—frames drawn correctly</td>
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<td>Correct isometric angle to fenestration</td>
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<td>Lintel</td>
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<td>Top of wall</td>
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<tr>
<td>Roof structure</td>
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<td>Roof cladding and insulation</td>
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<td>Superstructure—fills correctly used</td>
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<tr>
<td>Correct isometric angle to roof</td>
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<td>Different line weights</td>
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</tbody>
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**Names:**

- Thomas Morgan
- Ben Naylor
- Troy East

**Dates:**

- Wednesday, 29 September
- Wednesday, 29 September
CANOPY RAKE DETAIL

- Pre-finished metal parapet cap
- Lap membrane roofing over top of parapet
- 2x treated wood blocking (cont)
- T.O.S.
- 17-6'/2" A.F.F.
- 9/" exterior grade plywood membrane roofing
- T.O.S.
- Varies
- 1½" rigid insulation
- Metal deck
- Steel beam
- 4" metal studs @ 16" o.c.
- Drip edge
- Aluminum composite panel color - 2
- Soffit
- 10'-2" A.F.F.
- 9/" exterior sheathing
- Weather barrier (type 2)
- 7/" furring channels
- Aluminum composite panel system
Revit wall sections and axonometrics
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Revit wall sections and axonometrics
a foundation of collaboration can be laid for BIM practices
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collaboration as a natural part of BIM building detailing

colocation creates better quality solutions in collaborative AEC projects

productivity is enhanced by peer resources and shared communication

workflow knowledge is fostered by tasks and by comparison to peers

assessment provides knowledge about professional terms and communication protocols
A foundation of collaboration can be laid for BIM practices.

- Students become well familiarized with scheduling and action lists.
- Measure productivity against peers because of parallel efforts.
- Work is transparent.
- Collaborative nature of the assignment and the class environment creates engagement across students.
- More questions are answered by peers rather than instructors or other faculty.
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