EXPERIENCING PRODUCTION LAYOUT: A NOT-SO-EASY TASK

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Introduction

Incorporating experiential learning in the classroom has become common, and in some cases, a necessity to ensure learning outcomes. To be effective, any experiential learning module must combine the experience with reflection to support the learning process (Kantula & Threnhauser, 1999). Successful exercises offer complexity which affords the opportunity to explore many dimensions of the intended subject, but also have a defined purpose which centers the discussions on key learning outcomes.

This paper describes an exercise utilized in a principles of management course to emphasize the production management topic of facilities layout. This course serves as a pre-requisite to all other business courses, surveys many sub-fields, and is primarily populated by sophomores. Prior experience suggests students have limited experience in managing operations, and in the aggregate, do not have sufficient background to comprehend the general concepts associated with making things. Conducted as an in-class seminar, this exercise seeks to address these shortcomings.

Seminar: Facilities Layout

This exercise challenges teams of students to design and implement an envelope-stuffing process. Teams are provided with specifications of the finished product, inventoried stock, and general facilities conditions. Their task is to work in teams to design a system to effectively and efficiently produce a finished product. Specifically, they must determine the processes that will allow them to collate 8 sheets of paper (different colors), clip them together, insert them into inter-office envelopes, seal the envelopes, and address the envelopes as directed. On the surface, this seems an easy task, and also a simple design, however, given the constraints of space and time to design, the exercise becomes complex and ripe for critique.

Goals and Learning Objectives

At the core of any experiential exercise should be a statement of one or more outcomes, however such outcomes should take the form of "do" statements. That is, what will the student be able to "do" once the learning activity is completed? Once identified, the role of the instructor is to provide an appropriate environment to build the skills necessary to "do", but also to provide the knowledge (principles) to support the skills. In the case of this exercise, the "do" items include (but are not limited to):

- Design an effective and efficient system to satisfy the specifications
- Work with others to satisfy project outcomes
- Effectively present the design and participate in constructive critiques
- Incorporate critiques into re-design efforts

In the case of this particular exercise, the instructor's role is to assign appropriate readings on facilities layout, provide a detailed project specifications, and prepare the needed materials. In application, it is appropriate for the instructor to avoid answering questions about the exercise, leaving the decision-making to the dynamics of each production team.

The Exercise and Teaching Notes

An example of the Exercise currently in use, as well as a set of teaching notes, is appended.

Each team is provided large-scale paper (roughly 3 X 4 feet) for the preparation of their design, markers, and masking tape. Once posted the designs serve as the focal point for each team's presentations and critique. Several variations on a theme can be utilized to spearhead the critiques. For example, one involves representatives from each team "grading" all other team's displays, using the specifications as a grading guide. Each grading team then explains why they awarded the grade given. Another approach assigns two team members from each team to a design (not their own), and they are then responsible for explaining the design using the specifications as a guide.

Generally, the shortcomings of the designs are readily apparent, and teams are instructed to "do it again", which of course, they detest. Teams are given another piece of large-scale paper on which to create their revised design; these are posted and critiqued in similar fashion to the first round.

Experience has shown that student-generated critiques generate broader discussion and improved re-designs.

At this point, teams are allowed to volunteer to "test" their design in real-time. After a team has been selected and they have committed to how many completed envelopes they can complete in 5 minutes (this time can vary at the discretion of the instructor), the "room" is made ready. Using an open space in the classroom, masking tape is placed on the floor to delineate the walls and a table is moved into the "room". Once set, the instructor says, "Go" and starts the clock.

For quality control, one team (or representatives from several other teams) either volunteer or assigned as "observers" who look for violations or variations from the displayed design. They also serve as QC inspectors of the finished product(s) once the time has run out.

Key Debrief Items

As with any exercise, working with students to understand effective critiques is vital. Emphasis on ways to improve, as wall as highlights of elements that work well, is key to effective critiques. Vague, ill-defined responses are not appropriate. Neither are brutal attacks. The instructor's role is to model appropriate critiquing skills by encouraging students to ask questions that begin with "why" or "how". Instructor experience reveals some common pitfalls.

- No design allowance for collecting materials from inventory (this is the #1 mistake, and worthy of discussion)
- Failure to comprehend the space limitations of the room, table, and task
- Ill-designed task roles
- Limited or no quality control standards, measures, or methods

References

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Production Layout Seminar

Time:

Design	15 minutes
Presentation preparation:	10 minutes
Presentation of design:	5 minutes

Deliverable:
Design an effective and efficient system using a production team and a control team to maximize the quantity and quality of finished products in the time allotted.

Materials available from inventory:
- 8 separate stacks of standard sized paper (8 different colors—50 sheets of each)
- 50 large (10" X 13") "interdepartmental" envelopes with fold-over flaps and tie-down strings.
- 2 ball-point pens
- 50 paper clips

Other Resources:
- 1 table, 36x48"
- Room size is 6'-0" X 8'-0" with one access point at 3'-0" wide.

Product Specifications:
Each set must be collated; paper clipped in the upper left-hand corner of the page, and inserted into the envelope, facing page toward the back of the envelope. (The back is the side with the flap and tie-down.) Each envelope must be "sealed" by securing the tie-down tab and the mailing labels on the envelopes must be "marked" by writing "Jackets" in the spaced called "Name" located in the 1st column, 3rd from the bottom on the back side of the envelope. Remember: Quality Matters.

The collating order for the pages is as follows:

Page	Color
1.	Green
2.	Purple
3.	Pink
4.	Orange
5.	Blue
6.	Grey
7.	Peach
8.	Yellow

Document your design ideas in preparation for presentation to the class. Paper and markers are available for your presentation.

Design presentation should include:
- Graphic Process Layout (picture of your design)
- Role Descriptions (what each worker does)
- Quality Control Procedures (type and metrics/measures)

Be sure the names of all your participants are on the Process Layout.

Production Layout Seminar

Teaching Note:

This simple seminar project has two parts. The first requires the design of a production system in a small group setting. Students can be assigned to groups of 5 or 6 using a variety of methods, but random assignment works well in this setting. If desired, a sub-set set can take responsibility for design and another for implementation. During the design phase, students are expected to document their design ideas for presentation to the class. Briefing, design, documentation, and presentation should take 30- 45-minutes, but the timing can be adjusted to fit particular class needs. Groups must post their designs in the room. Be sure to bring along large sheets of newsprint and markers.

The second part of this seminar allows the groups to implement their designs. To do so, the instructor must have pre-arranged the collection of materials listed in above in "inventory". It works best if the students do not know they will actually implement their designs. One approach can provide pre-packaged materials needed for each group for ease of distribution. Another requires the production teams to "pull" from inventory, a vital, and often missing part, of the original design.

By any number of selection methods, allow one or more groups the opportunity to test their production layout and produce as many completed envelopes as they can. Use a stopwatch to ensure equal time for each group. Evaluate output on the basis of quality and quantity.

Each group must follow their original design. Allow time at the end of the exercise to de-brief about process improvements. One variation allows one or two competing team members to serve as "inspectors" who note variances in implementation and design, as well as quality control of the finished product.

Note 1: In this exercise, colored pages, paper clips, and re-sealable envelopes are used to allow for re-use in future classes.

Note 2: While teams determine which will go first, instructors must delineate the room size (e.g. place masking tape on the floor to simulate the walls) and install the work table.

Evaluation Rubric

10% Active design phase—involvement of group
20% Thoroughness of design—consideration of design criteria, tie to POM readings
20% Completeness of Presentation—does it tell a full story?

20% Adherence to original design
10% Output (quality and quantity)

20% Individual Participation