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## BLENDED LEARNING PATTERNS FOR COURSE DESIGN

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### Abstract:

Design patterns provide an overall structure for describing best practices. Design patterns originated in the field of architecture and urban design and gained popularity in programming and human-computer interaction. Instructors have recognized the value of design patterns for common course design and instructional issues. Pedagogical patterns specify a problem, provide the context, suggest resolution strategies, describe assessment activities, and identify related patterns. In this paper we apply pedagogical patterns to blended learning course design. We present an overview of pedagogical patterns, describe the collaborative effort involved in creating and assessing patterns, provide an example of pedagogical patterns for blended learning course design, and discuss how pedagogical patterns can advance our understanding of what works in the blended learning context.

**Keywords:** blended learning, course design, pedagogical patterns

### I. INTRODUCTION

While many instructors may be interested in teaching blended learning courses, moving to this delivery format will require a change in the way instructors design their courses. Faculty can underestimate the significant course redesign effort required to create effective blended learning courses. For example, they must learn effective strategies for teaching online, develop needed materials for online course components, and reflect on activities that are best done in the class versus face-to-face [Garrison and Vaughan, 2008]. Faculty development may come via local teaching and learning centers, regional and national teaching conferences (e.g., EDUCAUSE, Scholarship of Teaching and Learning (SoTL) Commons, and International Society for the Scholarship of Teaching and Learning conference) or peer-reviewed books and journal articles. When confronted with the upfront costs required to prepare for blended learning, some faculty may shy away from teaching in this format. Even those that do agree to teach blended learning courses may not be able to invest time and money to read available materials or attend professional development workshops. Instead, faculty need prescriptive advice in an easy-to-read format on common challenges in teaching blended courses. They also could benefit from a ready resource for problems that arise throughout the course life cycle, a form of “just in time”. Such a training resource would direct them toward solutions to the particular problems they are facing at the moment with the course.

To address this need, we focus on codifying the knowledge that experienced practitioners have for use by others through the use of design patterns. Design patterns provide an overall structure for describing best practices. Design patterns were first used in architecture and urban design

[Alexander et al., 1979], have gained popularity in the software engineering community [Bayle et al., 1998, Gamma et al., 1994], and have had some use in education circles [Haberman, 2006]. Pedagogical patterns specify a problem, provide the context, suggest resolution strategies, describe assessment activities, and identify related patterns. When patterns are accepted in practice, they improve communication among people within the community and assist in the development and training of novices to the profession.

In this paper, we define blended learning patterns, the application of pedagogical patterns to blended learning course design. Blended learning patterns are practical and general solutions to challenges faced during design and teaching of blended learning courses. We present an overview of pedagogical patterns, describe the collaborative effort involved in creating and assessing patterns, provide an example of pedagogical patterns for blended learning course design, and discuss how pedagogical patterns can advance our understanding of what works in the blended learning context.

## II. PEDAGOGICAL PATTERNS

The concept of design patterns originated in architecture with Christopher Alexander and his colleagues [Alexander et al., 1979] who were looking at effective approaches to urban design. In doing so, they created a dictionary of terms they referred to as a *pattern language*; these terms were the source for a set of basic design decisions. A design pattern describes the problem, the solution, when to apply the solution, and its consequences:

“Each pattern describes a *problem* which occurs over and over again in our environment, and then describes the *core of the solution* to that problem, in such a way that you can use this solution a million times over, without ever doing it the same way twice.” [Alexander et al., 1979]

Each of Alexander’s design patterns was described using the following predictable structure:

- A picture showing an archetypal example of the pattern.
- An introductory paragraph setting the context for the pattern (explaining how it helps to complete some larger patterns).
- ‘\*\*\*’ to mark the beginning of the problem.
- A headline in bold type to give the essence of the problem in one or two sentences.
- The body of the problem – its empirical background, evidence for its validity, examples of different ways the pattern can be manifested.
- The solution in bold type. This is the heart of the pattern – the field of physical and social relationships that are required to solve the stated problem in the stated context. It is always stated as an instruction, so that you know what to do to build the pattern.
- A diagrammatic representation of the solution.

They envisioned design discussions conducted using this language so that design at all levels would spring from this common base. Alexander’s intent was not to tell you how to design but rather to help you decide what should be designed. Alexander’s view was that you could make up whatever patterns you believed would lead to good designs. Ultimately his intent was to distribute responsibility for design through all levels of a large hierarchy, while still maintaining consistency and harmony of overall design.

Based upon Alexander’s work, design patterns were applied to software design and spearheaded by the “Gang of Four”: Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides [Gamma et al., 1994]. Patterns also gained popularity in the human-computer interaction (HCI) community, following a 1997 workshop at Conference on Human Factors in Computing Systems (CHI). There, the Interaction Design Pattern (IDP) was described as a ‘pattern that describes a connection between a repeatedly encountered problem and a solution that has been proven in the field, across time and circumstance’ [Bayle et al., 1998, p. 19]. The workshop participants

arrived at some common observations about patterns. First, patterns range from very high to very low levels; the higher levels are more robust over time, whereas lower level patterns are more likely to change quickly. Second, pattern making is an engaging and enjoyable experience that is an invaluable way to immerse oneself in a situation. While it may be fun to begin seeing and making patterns, it is difficult to make good ones. It is even more challenging to build an entire pattern language (something that took Alexander and colleagues a decade to accomplish for architecture). Finally, pattern making needs to be a widespread collaboration. This view is exemplified by the Hillside Group, which sponsors various Pattern Languages of Programs (PLoP) conferences to promote a community of pattern builders who collaborate and disseminate their work (<http://st-www.cs.uiuc.edu/users/patterns>).

In an attempt to apply design patterns to education, computer science educators developed the notion of pedagogical patterns. These patterns could provide descriptions of teaching methods that would solve problems and produce shareable approaches [Haberman, 2006]. Originally, the patterns consisted of a collection of single examples on a common theme; an early focus was on instructional methods that could enhance student motivation to learn computer programming skills. These patterns have since changed with an emphasis on smaller, more specialized areas with a single author or a small group. The Pedagogical Patterns Project [2001], an international group composed of instructional designers from academia and industry, have similarly taken the concept of patterns and applied it to instruction and learning. Early on, the project was focused on mining patterns from instructors; this resulted in a significant collection of patterns. The template used by the Pedagogical Patterns Project ([www.pedagogicalpatterns.org](http://www.pedagogicalpatterns.org)) included information such as name, thumbnail, audience/context, forces, solution, discussion/consequences/ implementation, special resources, related patterns, example instances, contraindications, and references. However, more recent efforts have been focused on finding commonalities across the patterns that would inform instructional design [Bergin et al., 2001].

A group of European institutions formed a network of e-learning centers called the E-LEN project. One of this group's main objectives was to identify and gather best practices in e-learning by creating a collection of design patterns. The project was completed in 2005 and the pattern repository is available online at <http://www2.tisip.no/E-LEN/>. The template used by this group included name (problem and solution), category (pedagogical/organizational/technical), abstract, problem, and analysis.

### III. BLENDED LEARNING COURSE DESIGN

Students are driving the explosive growth in online learning. They are demanding flexible scheduling, access to world-class programs, and self-paced instruction. Although students show a strong interest in different instructional delivery modes [Allen et al., 2005], online learning has some limitations. Learning experiences such as field training, observation, initial group collaboration meetings, and laboratory exercises may be better experienced face-to-face. In addition, students with low computer literacy skills may find it more challenging to navigate online courses [Senn, 2008]. The emerging trend in education is to blend text-based asynchronous web-based technology with face-to-face learning, often referred to as blended learning. By incorporating rich, online learning experiences that promote communities of inquiry, blended learning can support meaningful learning outcomes [Garrison and Vaughan, 2008]. There is no one single blended model. The approaches vary from one end of the spectrum in which a face-to-face class uses technology to augment the class, to the other end, in which significant online activities are interspersed with class meetings. What distinguishes the blended model is the degree to which it integrates the two main components (face-to-face and Internet technology) so that it does not appear to simply add to the dominant approach [Garrison and Kanuka, 2004].

Blended learning is not simply more of the same, that is, a traditional format with a sprinkling of web-based activities. Levy [2005] refers to this tendency as a "juxtaposition of new technology and old pedagogy." Instead, it requires a rethinking and redesigning of the teaching and learning relationship. If contemplated with some thought, blended learning can transform educational environments, but not without the commitment of instructors to rethink their pedagogical

approaches and create an entirely new teaching presence. Garrison and Vaughn [2007] state that ideally the blended course requires these elements:

- In-class activities that link with online assignments so as to reinforce the intent of activities outside the classroom;
- Shift from teacher-centered to learner-centered activities in-class as well as online;
- Focus on student responsibility for navigating online resources and conducting online research; and
- Evaluation instruments that provide frequent and effective feedback.

The challenge is to provide faculty with the structure and resources that facilitate blended course development. Reflecting on the above elements that are crucial to a well-designed blended course, we propose identifying patterns that embody the design principles to support this redesign effort.

#### IV. METHODOLOGY FOR CREATING PATTERNS

The two main components of generating a pattern are: identifying a problem that occurs over and over again and finding a successful strategy to solve this problem. As the E-LEN team suggests, pattern generation can be done in either way: by identifying a problem and then looking for strategies and solutions or starting with a strategy that seems to be working successfully. It is also important to ensure that the strategy is not a specific solution to a specific problem. Providing a general strategy to tackle the problem that can then be tweaked as necessary by the user is at the core of pattern creation.

Keeping these central ideas in mind, the three authors collaborated to create initial blended patterns. We agreed upon a format for creating our patterns. To distinguish this work from other pedagogical patterns, we incorporated elements that would be meaningful to blended learning teachers. For example, in the context section, we discussed why the problem is relevant to blended learning courses. In the solution section, we discussed activities that could be done both before, during, and after class. We began by identifying some of the most important problems faced by us when designing and delivering our hybrid course; namely, students did not complete reading assignments before coming to class, and students varied greatly in their proficiency with course technologies. These patterns described the problem, suggested a strategy for improvement, and provided examples and assessment methods.

This research is still in progress as we intend to create additional patterns and need to conduct a more thorough evaluation of each pattern. In the next section, we provide an example pattern from our early work.

#### V. EXAMPLE: INDEPENDENT LEARNING PATTERN

**Name:** Independent Learning

**Problem:** Students may not be motivated to complete reading assignments that lead to in-class activities.

**Learning Outcome:** Students will demonstrate, through individual and group assessments, the ability to discuss and debate key issues related to assigned readings.

**Context:**

- Students must read and interact with course content outside of class. In a hybrid class, since there are fewer in-class sessions, the instructor is less likely to repeat concepts.

Furthermore, the instructor will expect students to be responsible for material that may never have been discussed in class.

- In-class sessions depend upon successfully completing background material assigned by the instructor and available online. In the hybrid class, because in-class time is so precious, the recommendation is to integrate active learning activities that, as the research shows, results in deeper learning. Course redesign should include moving the delivery of course content online and minimizing passive approaches, such as lecture, for the in-class session. The key point here is the notion of joint responsibility – both on the part of students and instructors.

### **Solution:**

#### **What You Should Do:**

- Provide sufficient guidance to students
  - Lesson objectives or learning outcomes
  - Supplementary material like video tutorials and/or podcasts
- Attach value to the activity of independent learning.
  - Award points for pre-class preparatory activities
  - Create in-class group activities/games/discussions that require pre-class preparation and encourage participation. Award points for these activities

#### **Examples:**

- Pre-class: require students to complete an outline and post doubts to a discussion forum (or twitter :-)). In-class: Students submit outline to instructor. In-class discussion revolves around doubts posted on the discussion forum. Outline can be used as a resource during a test/quiz.
- Pre-class: Read independently. In-class: Supplement topics with discussions/group activities/games and award points in class if they get the correct answer.
- Pre-class: Read independently and take low-stakes quizzes with multiple attempts and the highest grade counted. In-class: Break students into groups and present a scenario related to the reading topic. Assign each group a question and have them report the solution back to the entire class.

#### **How to do it:**

- Pre-class Preparation focused on reading retention (student)
  - Look at the course calendar to determine due dates for reading assignments. Complete any assigned online quizzes/tutorials. Provide key questions on the assignment to the instructor in the required format (discussion posts, Minute paper, in-class discussion, etc.).
  - Students held responsible for the first exposure to course material outside of the classroom. Teacher assigns value to pre-class work (like reading and outlining) and in-class work that is dependent on the pre-class work.
- Pre-class Preparation focused on reading (teachers)
  - Assess your students' prior knowledge: (1) Provide them with a list of single-word concepts that define study in your field. (2) Ask the students to write everything they know about each of those concepts and how each is related to the other. Require students to list the concepts related to the subject. Define how these concepts relate to one another.

- Provide clear purposes for every reading assignment. Think about the article/chapter/etc. in its entirety and what background you expect it to provide for your students. Ask questions that require synthesis and application of that knowledge. At least one of your purposes needs to be at this level. The other two could be less intimidating so that the students don't lose hope as they are growing into scholarly consumers of information.
- Provide organization/processing tools to help your students actively engage in reading their assigned texts. These tools may include a graphic organizer that requires them to analyze the information in the reading.
- In-class (teachers) -- Reinforce material read through a brief "active lecture" followed by problem solving exercises that students complete within small groups. Class ends with instructor going over any concepts that may be difficult for many groups.

## VI. DISCUSSION

As more universities and colleges offer blended learning courses, many instructors will have to start with a completely fresh perspective towards their course design. These pedagogical patterns for blended learning can help instructors in identifying issues even before they occur (example: lacking prior experience an instructor may not realize the importance of students' technical skills and thus may undermine the effect of fitness screening process) and can provide them sufficient guidance in a prescriptive format to handle these problems. The benefit of patterns can be realized completely when it becomes a widespread collaborative effort. Patterns created need to be evaluated by others and refined for clarity. Hence, in the future we plan to focus our efforts on community building activities like creating a shared web space for instructors to contribute their patterns and exchange ideas. Conducting workshops is also another effective way of disseminating our patterns, building a community and generating more patterns.

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