

Design for Pedagogy Patterns for E-learning

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Abstract

This paper discusses a theory for the foundation of design for pedagogy based on the principles of pattern languages. We develop a pattern using a variation of the Alexandrian pattern structure to embed pedagogy at the core of the design of e-learning. A pattern dealing with the organization of an online discussion group based on the principles of constructivism and experiential learning is produced to illustrate the application of the theory.

1. Introduction

This paper adapts the classic Alexandrian pattern structure [1] to allow the addition of a pedagogical layer, thus changing the emphasis on design for e-learning from usability to pedagogy. We present an empirical evidence-based approach ultimately able to create an entire design for pedagogy pattern language.

2. Mapping e-learning to design patterns

Designing an e-learning application is recognized as being a “wicked” problem [7] – one that has numerous stakeholders with conflicting perspectives. Wicked problems have multiple solutions and can be dealt with by using design patterns. By breaking a set of design problems down into integrated components, pattern languages provide a vocabulary for designers to capture and transmit the design process.

The problem with the Alexandrian pattern structure is that when inserting pedagogical theories, the focus moves away from *design* onto *pedagogy*. The pattern becomes a pedagogical pattern. If the pattern focuses on design, there remains little scope for including pedagogy, becoming an either/or proposition.

The theory for a design for pedagogy pattern presented in this paper is the performativity of any language of design [2]. A design language must be comprised of coherent elements (aggregation), principles of re-contextualization (accumulation), and principles of selection (appraisal). A design for pedagogy pattern must show the relationships between pedagogic strategies associated with the design elements and those linked with the general and abstract ways of thinking about education, including the social and the educational context, teaching practices and the tactics for engaging students. The pattern should make the pedagogy explicit, and how it is articulated through image, text, simulations and interaction.

Constructivism contends that knowledge is sustained by social processes, that knowledge and social interaction are inseparable. [9] Therefore the design of e-learning systems needs to include the ability for social interaction. Using the Function-Behaviour-Structure framework [3] we can decompose functions in terms of interactions and in terms of pedagogy. Each of these functions may serve a dual purpose: interaction purely in the contact with the online courseware, but it may also serve a pedagogic function in how it aids the learning. The behaviours are they way that the courseware itself achieves the function.

Alexander’s hierarchy of large-to-small elements can be mapped onto that of e-learning courseware in the hierarchy between elements. Realizing a resource depends on two factors: the functional characteristics and structural characteristics of resources at the next level up (a vertical relation); and, the context in which the e-learning system is being developed (a horizontal relation). An individual pattern is difficult to evaluate on its own; it is deployed within the context of the patterns that support and surround it [1]. Consideration

must be given to the links and relationships between the patterns.

There are higher level pedagogical issues to deal with as well, which define the educational problem space:

- A pedagogical philosophy (e.g. how we think people learn),
- high level pedagogy (e.g. problem based learning),
- pedagogical strategy (e.g. the use of an online debate)
- pedagogical tactics (teaching practices) [4]

This research takes a pedagogical philosophy gaze through the lens of constructivist and experiential learning. This informs the high level pedagogy of each learning solution and the strategy and tactics are created accordingly. One would expect a pedagogically-based design pattern to contain:

- Elements based on the Alexandrian model (e.g. picture, background, problem, solution, diagram, links to lower patterns).
- The inclusion of a pedagogical philosophy (e.g. constructivism and experiential learning).
- Design solutions based on high level pedagogies and pedagogical strategies.
- Teaching practices to support the design solutions.

3. A design for pedagogy pattern

To demonstrate these principles, we created a method to operationalize the embedding of pedagogical theory into the pattern language production process; and developed a pattern called *Engaging Discussion Groups* to show the method in use.

3.1. Methodology

1. *Text search for pattern problem*, by the writer.
2. *Definition of problem*, based on the text search of existing literature and e-learning courseware.
3. *Search for solution, teaching strategies and optional case studies*, which fit constructivist and experiential learning theories (or other pedagogical theories).
4. *Write solution and teaching strategies* in terms of the pedagogical philosophies.

The aim is to refine the method for producing design patterns, not just to develop a pattern per se. Steps 1 and 3 require empirical evidence from peer-reviewed articles on the design and use of e-learning courseware.

3.3. The pattern: engaging discussion groups

3.3.1. Background. This pattern addresses the design of a discussion group and how it can be complemented by the facilitator to lead online discussions. This allows students to reflect on the materials, collaborate and construct new knowledge by connecting with other participants. It complements the COLLABORATIVE LEARNING, INTEGRATED COURSEWARE and LEARNING PORTAL patterns.



3.3.2. Problem. A discussion group is the most common method for participants to interact in e-learning. How does one encourage participants to engage with a discussion group?

Often the only opportunity for students to get to know their cohort, the tools made available in the discussion group and the strategies used by the facilitator can either encourage engagement or form a block to person-to-person interaction. The design of the discussion group is critical, as is the skill of the facilitator in involving the students. With the suitable design tools, it is easier to elicit involvement from the course's participants. Poorly designed discussion groups discourage participation and increase the feeling of isolation often associated with e-learning.

3.3.3. Solution. Create a discussion group that allows participants to use a full range of rich media, which encourages participants to create biographies and interact on a social level. Create spaces for social interactions as well as course-related discussions. Allow an anonymous login, which encourages student participation in content related discussions. Let users to know when others are logged on, so that discussions can be directed to those able to give a quick response.

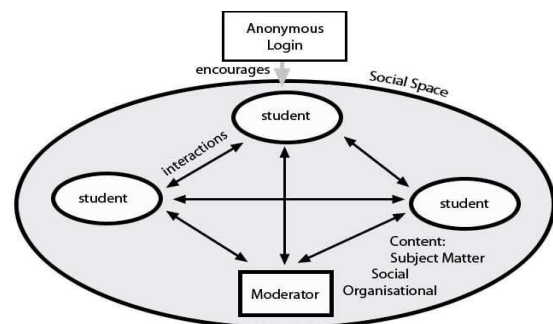


Figure 1. Diagram of pattern solution.

3.3.4. Teaching strategies to accompany this pattern. Help novices feel welcome, introduce yourself and encourage students to post about themselves, even short biographies, videos and photographs [8]. Do not dominate the discussion; instead, facilitate student-to-student group interactions.

Create a calm, friendly and relaxed atmosphere. Encourage students to interact socially rather than restricting the discussion to course content [6]. Give positive feedback, and emphasize the importance of peer feedback by allowing the students to interact not only during the learning activities, but beyond them. Encourage the students to look not only to yourself as a source of help, but to each other [6]. Re-educate the learners to interact with the ideas at a deep level. Formulate a process that allows students to inquire into concepts, critically analyze their own views and revise concepts when exposed to conflicting ideas. This requires students to articulate their understandings and misconceptions – difficult when students edit themselves in order to appear knowledgeable. Social inhibitions often prohibit open inquiry – particularly if forum contributions are being assessed [5].

Present the students with real-world problems, which are largely ill-defined, to discuss and solve collaboratively. This enables students to construct their own knowledge while considering different approaches and perspectives [5]. Be prominent when you scaffold student learning as this helps students engage in a higher order of thinking. One way of doing this is to post a problem, moderate the discussion, and then post a summary of the different viewpoints. Make each team take turns to post a solution. Provide support by mentoring students offline before they present their solution. Play “devil’s advocate” in the resulting discussions to challenge the different viewpoints and to promote deeper enquiry [5].

3.3.5. Consider these other patterns: THREADED DISCUSSIONS, MODERATION and SOCIAL SPACE are all required to complete this pattern.

3.3.5 Case study. A study conducted at Tel-Aviv University’s School of Education revealed that more content related interactions occurred when students logged in to an online forum using anonymous nicknames. The anonymous nicknames made the students feel that they could say what they wanted, without repercussions in the real world. The presence of a moderator was also found to reduce the number of negative social interactions, thus addressing the issue of trust [6].

4. Conclusion

This paper outlines a theory for the production of a design for pedagogy pattern, illustrated by placing constructivist and experiential learning theories at the core of an e-learning pattern. Teaching and learning is thus placed at the centre of the design process. By

creating a theory for the development of design for pedagogy patterns, this research is able to provide the means to write a pedagogically-based design pattern language for e-learning. The design of e-learning courseware therefore becomes “learner-centered”, rather than the customer-driven usability focus given to commercial interaction design. This “learner-centered” approach continues with guidelines on the teaching practices that could accompany the design solution.

5. References

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