

Design Learning and Learning Design Systems

Arne Collen
Saybrook Institute
San Francisco, California [1]

1. Introduction

It is helpful for me to begin with a preliminary look at the question, "What does a system for design learning mean to me?" My search for an answer will be guided by some introductory thoughts about learning, design learning, and systems for design learning. After a brief consideration of these topics, I will discuss my general interest in the question.

2. Learning Is a Process

Learning is an interactive process. The interactiveness embodies reciprocity and mutuality. It is a process of communication and conversation between a human being and the environment, and among human beings, which results in a discernable change in both the learner and the system of which he or she is a part. The changes are the results of act and react, of interaction.

Learning is an interdependent process. It involves the relationship between a learner as a self-organizing system and other. One cannot be a learner without inclusion of that which is to be learned. One cannot learn without a supportive place and time in which to do so. The process of learning is defined through the convergence of the learner, that which is to be learned, and the learning environment.

Learning is a hierarchical process. It transpires at several levels, for there are several levels of complexity to systems (Miller, 1978). If the primary system of interest is the person, then learning tends to be associated with the person. If the focus is on learners, then it tends to be the social and organizational learning of the group. If the focus is the environment, then it tends to be the contextual ecological learning of the societal cultural system. The primary system of interest serves to focus our study of the process and provide a point of reference to which and from which we can relate all aspects of learning. Furthermore, the hierarchical nature of the process is reflected within the process itself over time, such that the earlier period of information acquisition, problem formulation, and question asking, gives way to constructive problem solving and trial-and-error experimentation, followed by more reflective struggles with learning from learning. All levels of learning are ongoing, but different levels become more the foreground at different stages of the process.

In making such statements to this point, I do not mean to suggest that a change at one level of complexity is independent and exclusive of other levels. Learning is a consequential process. Learning takes place beyond the provinciality of our focal system, perhaps mimicking the metaphor of a stone dropped into a pond, generating an inward and outward rippling effect. To take the level of person for example, changes in a person's words and actions impact on others and from there spread into the environment. Although we often focus on the person, the process must consider reciprocity and mutuality between the person and other people, things, and surroundings. I use intentionally the word reciprocity, because it conveys an interdependence between the giver and receiver of the action. Thus, to witness the learning process, to detect learning in progress from a systemic perspective, we would look for evidences of change not only in the learner but also between learners as pupil and teacher, among learners as colleagues in collaboration, and among aspects of the learning environment as coworker activities in the execution of institutional practices.

Learning is a transformative process. It produces a myriad of subordinate changes which can contribute to changing the learning system. Alterations at various levels of complexity provide more proximal evidence of learning. The profundity of transformation will depend on our ability to study and detect hierarchical (vertical) and heterarchical (horizontal) changes in the learning system.

Learning can be an evolutionary process. There can be sufficient transformations so extensive as to alter the learning

system. The system destabilizes, and we began a period of reaction, like a falling cat, to right itself. However, transformation means more than an apparent return to equilibrium. It implies reorganization, such that once restabilized, the system that began the process at some specified time in the past is no longer quite the same system we interact with and experience in the present moment. Learning can be considered in relation to the autopoiesis of the learning system; however this difficult theoretical topic as yet rarely seems to enter the practitioner's arena of concrete systems for design learning.

In sum, to understand fully the process of learning from a systems perspective, we must carefully consider the interactive, interdependent, hierarchical, consequential, transformative, and evolutionary nature of the learning process. What is learning? This question is one of the most central we can ask. Our response will shape subsequent systems design issues and the design of design learning systems.

3. Design Learning Is One Kind of Learning

Regardless of what we do in life, there is always much to learn. Learning is an ongoing, lifelong process. Knowledge acquisition is one form of learning. Classical, operant, and avoidance conditioning are other forms of learning. Learning to dress, drive an automobile, relax, work efficiently, and be quiet with oneself are also forms of learning. And learning to learn is a form of learning. But learning to design, in the sense that one designs a thing to be made or a task to complete, seems to me different still.

Design learning can be distinguished from the making of the thing or engaging in the task. Consequently, I think the designing and the making/doing take not the same form, and as such, any formulation which professes an extreme position as sustainable today that either they do, or they do not — sometimes echoed in a designer's propensity to prescribe the future of designing-to-making, as activities to be entitled to and controlled by designers — is best questioned. We build and pilot what we design. By trial and error we revise (redesign) and even perfect what we build until it fulfills our expectations, its function. Perhaps, this distinction has become seemingly more separate with advances in technology, especially computer imaging. On the other hand, they may seem increasingly less separate and more interdependent activities. But some problems of today, such as global population and pollution, are not the same problems of yesterday, especially of scale and complexity; for their amelioration will require, in my opinion, a

very close coordination between design learning and utilization activities. Understanding the process of design is a necessary and critical part of better design and its more effective and efficient application to a broad range of problems and systems (Gasparski, 1984). Furthermore, a coming ethical global imperative will likely compel us to consider and develop more carefully and humanely the design-making/doing interface and their implications regarding the resultant material, technological, and informational products.

The terms, concepts, principles, and processes of design learning comprise the subject matter to be learned. They comprise generic design learning. This body of knowledge is augmented through their interplay with such issues as learning to learn to design an education system. The application of design learning generics to education, engineering, computer science, sociology, biology, and other fields of study is specific design learning.

Whether it be generics or specifics, articulating effective pedagogical methods which use the systems approach to accomplish design learning would be an achievement consistent with learning systems design itself. This task is a major challenge for educators in the systems sciences.

4. A System for Design Learning Is a Form of Education

A system is crudely defined by the chief elements and interacting patterns created by them. These elements and patterns require specification and description. The "for" in the phrase "system for design learning" prescribes the purpose of the system. The objectives of the system become the acquisition, understanding, and use of the subject matter of design. We might state this body of subject matter more clearly by using the phrase "systems design learning." Also, the self-application of the subject matter to the continued change and improvement is a necessary objective, to remain truly systemic in usage. Such a system is one member of a family of systems classified under the rubric of education.

There is much to discuss regarding the failures of contemporary education systems even to optimize, let alone maximize, the learning process in current educational environments. But some discussion is required to look at the original purposes of establishing education systems and the course of their institutionalization, so that the sociological, cultural, political, and economic context can be properly understood in designing and redesigning learning systems more applicable to contemporary life.

It seems to me that we do little through our societal institutions to design systems for design learning or train instructors to engage in the activity of teaching design learning. The engineer may learn to build a better bridge, the architect to design a taller skyscraper, and the fashion designer to create a more eye-catching wardrobe. These are all material accomplishments. I suspect that although the engineer, architect, and fashion designer, acquire their foundational skills for later professional work throughout their preparatory years, it is the projects of professional, occupational life that put their design skills to the test, and on trial, so to speak. In a similar vein, where do we learn to design better conceptual schemes of thought, sounder decision-making processes, and more cooperative mutually beneficial negotiation strategies among societal entities?

5. Characteristics of a System for Design Learning

A description of a system for design learning seems essential if we are to advance beyond terminology and basic concepts. Some degree of consensus building in this regard would appear to be a necessary part of the task. We need a common core, an agreed upon foundation, an understanding, if we are to make visible progress toward meeting our objectives. Generic design is central [2]. We also need useful models of the design of learning systems for education.

What are the key characteristics of a model of a system for design learning? Who are the learners? Who are the benefactors? What is the context? What are the core concepts, principles, and processes of design learning? Answers to these and related questions, I believe, will generate much about the characteristics of a system for design learning.

Table 1 lists some chief areas for a learners' discussion group which may yield descriptions characterizing a systems for design learning. I expect that a focused discussion on the generic aspects of design learning among a specified group of those most at the effect of that which is to be designed can foster the creation of a common ground for the design of a system for design learning.

Table 1. Some Generic Aspects of a System for Design Learning.

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|---------------------------------------|----------------------------------|
| •benefactors, people to be served | •aesthetics |
| •communication, interaction, activity | •ethical issues |
| •context, place, and time | •jurisdiction, system boundaries |
| •method and methodology | •people to comprise the system |
| •power | •purpose, goal, and objective |
| •resources | •subject matter, content |

However, as central as a discussion of design generic might be, it would be immensely helpful if generics could be supplemented, even discovered, through an in-depth consideration of specific design learning systems. Some case studies would be very useful. For example, the system of greatest familiarity to me is the graduate school in which I work. The teacher-student relationship is one central ingredient in any description of a graduate program at Saybrook Institute that could be conceptualized as an education system for design learning.

6. Design of Design Learning

The design of design learning entails the creation of an abstract information and conceptual system by means of a group process of learners engaged in the activity of generating it. This statement seems circular, but not really. It is iterative, developmental, and reflexive, for the dynamic of design of a design learning system is a learning process itself manifesting those characteristics described at the outstart of this exposition.

The ongoing development of the curriculum of every education program occupies an important place in the design learning process. This area can serve as a basis for common interests to bind student and teacher to a common cause. Curriculum development could be more a student-centered learning process and promote the professional development of both teacher and student. In this sense, the cooperative activity becomes one among co-learners, co-designers. Such a mutually beneficial pursuit may meet many of the participant determined objectives and general purpose of the learning system.

However, this approach brings to mind previous attempts at education reform during the 1960s that I witnessed in the United States. In retrospect, the radical frontal attacks on traditional institutions to disrupt them followed by the creation of alternative learning systems have produced many establishments now a part of a more complex problem. The redesign of our learning systems may benefit from a constructive attempt to apply a more systemic approach in the systematic transformation of our schools into more adept, learner-centered systems. I think we must make greater use of established and emerging tools to accomplish our task. For example, specific activities and the general process of designing design learning and designing systems of design learning could be put into practice through Soft Systems Methodology (Checkland, 1981; Checkland and Scholes, 1990) and the Systems Design Journey [3].

Both of these specific systems methodologies, e.g. SSM and SDJ, represent grounded, social action oriented approaches, which I have found amenable to pedagogical group processes with doctoral level students and mid-career professionals. Although we have been exploring in a limited fashion systems design at Saybrook Institute in the creation, evaluation, and revision of course manuals, and in the use of focus groups during our weeklong residential meetings with students, making use of such methodologies, our work is very preliminary. At this writing, we have scarcely scratched the surface of the potential for systemic inquiry in design at Saybrook Institute in particular and program/curriculum development in general.

7. Design of a System for Design Learning

Although the participation of students in the articulation of their education while maintaining a guiding and supervisory function for the teacher seems paramount, there is an unequal distribution of power in the relationship between student and teacher by the fact that the teacher generally knows more about the subject under study and has more control over the resources and information available. These facts are as they should be. But the nurturance of the co-learner relationship seems to me of equal importance. The power relationship needs closer study and re-examination, especially in regard to the adult learner; for as the learner matures, so does his/her ability to manage the resources and information available. Furthermore, the role of the teacher is becoming less and less as expert and disseminator of knowledge, and more and more as guide and facilitator of the learning process. Moreover, the shift toward conceptualizing education as a lifelong process rather than just another product of an industrialized society will press to the foreground the importance of design learning and the design of design learning systems.

A refreshing approach to the design of a design learning system can be embraced by combining the following contributions: hierarchy of living systems based on their complexity (Miller, 1978), design of a life (Churchman, 1982), and design of design inquiry (Banathy, 1986). There are several levels of complexity of systems: the pupil, pupil-teacher, class/learning group, program, school, and learning community. The life of the system of interest may be the person, the family, the social group, the institution. I am willing to entertain sufficient isomorphies among levels, such that the writings of Churchman become pertinent to various levels and types of systems described by Miller. Finally, the contributions of

Banathy and Checkland are germane to the process of design inquiry, and they suggests some types of learning systems, human activity systems, we may wish to consider.

With some understanding of the level of complexity and type of learning system we wish to design, and armed with descriptions of the characteristics, we can follow the journey in designing the design inquiry in order to set into motion a learning system which exists for the purpose of designing a system for design learning. We can think of this particular human activity system as ideal-seeking, and the system it seeks to emulate as an evolutionary guidance system. If this task appears too grandiose, then we can be more modest in our aspirations. We can use Banathy's design journey, for example, to obtain the descriptions themselves and/or envision the ideal system for design learning, or envision the system to design the system for design learning, without actually becoming or creating such systems. In either case, significant contributions by those participating can be made to systems for design learning.

8. The Future of Education

Although this topic has become an occasion for anger, depression, and heated debate over the state of education in the United States (National Commission on Excellence in Education, 1983), I believe we have an important opportunity to influence the future course of education through the application of the systems approach to the redesign of education systems.

In the United States many see this huge vessel called education — a clumsy, arcane, and rigidified bureaucracy containing our children who are destined to inherit our responsibilities for governing our societal institutions. Although my professional work is at the post-secondary level, I am intimately familiar with the primary and secondary school systems in California, having assisted my son and daughter to maneuver their way toward the university level. When I compare informally my schooling with theirs through the same elementary and high school, I become concerned. They seemed to have received some advantages unavailable in my time, yet there are other areas where my schooling seems superior to theirs. The comparison is rough, fraught with vagueness, deceptively simplistic, and perhaps unfair. A closer examination seems necessary to cull out the strengths and weaknesses of our present systems, so that we can know more precisely in what areas we can focus our concerns.

However, this examination must also help us turn to what is needed for the future. Must any national debate be so politicized as to become stuck in the quagmire of polemics and differing interpretations of the statistics? Regardless of the position taken on the question of quality of education, a more important priority is to act directly to assist the next generation through our work to redesign learning and redesign design learning systems. Perhaps then, we can begin to reap some of the satisfaction seeing our present education systems fulfill their goals more effectively.

While many will continue to debate the quality of education and the responsibility and accountability of educational institutions to society — in my opinion, a well beaten path of never ending criticism — we are now embarked on a general movement from a national to a global community [4]. No doubt, those concerned with not just national, but also international learning communities will continue this critique and harangue of education to the global level. It will soon become a salient issue given the worsening of aversive trends around the globe, for the education of the world's citizenry is part of the solution — to population control, poverty, hunger, pollution, disease — to global human survival. As a father, citizen, and educator, this priority translates into periodically redesigning education systems to enable everyone to contribute more effectively to this endeavor.

9. Summary

My purpose has been to put forward my thoughts on the general topic "a system for design learning." My statements have covered several key areas I believe important to ongoing discussions on learning, design learning, the design of design learning, characteristics of a design learning system, and the future of education. Although these areas may serve as useful lily pads to traverse about the pond of discourse, I trust the weight of our actions will take us far below the surface.

Notes

- [1] Developed from a paper, originally titled "Thoughts on a System for Design Learning" (1989), for the First Annual Research Conference on Comprehensive Systems Design of Education, Pacific Grove, California.

308 **Design and Systems**

- [2] The works of J. Warfield will be of interest to those focused on generics. See his chapter in this volume as well as J. Warfield (1990) *A Science of Generic Design*, volumes I and II, Seaside, CA: Intersystems.
- [3] See the chapter in this volume by B. H. Banathy on the design journey. More comprehensive description and applications can be found in Banathy (1991).
- [4] As we approach the twenty-first century, the consciousness of humanity at an increasingly global level, for education and many related issues, represents a mushrooming literature spanning especially the last quarter of the twentieth century. See for example, Reischauer (1973), Harman (1988), and the annuals by Brown et al., such as (1989).

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