The Post-LEGO Learning Object

The Artificial Learning Object

From its genesis, the so-called "learning object" community has used metaphors to explain to the rest of the world what it was we were talking about. Since not long after the realization that this might be a useful way to communicate, learning objects and their behavior have been likened to LEGO®s or Lincoln Logs®. These analogies continue to serve their intended purpose of giving those new to our field a easy way of understanding what we are trying to do: create small pieces of instruction (LEGOs) that can be assembled (stacked together) into some larger instructional structure (castle or spaceship). Unfortunately this metaphor has taken on a life of its own. Instead of serving as a quick and dirty introduction to an area of work, this overly simplistic way of talking about things seems to have become the method of expression of choice for those working at the very edge of our field -- even when speaking to each other. This point was driven home recently at a conference of a professional educational technology organization, where the LEGO metaphor was used in almost every presentation on learning objects, and even those on related topics such as metadata.

The problem with this trend is manifest in the degree to which the LEGO metaphor controls the way people think about learning objects. Consider the following properties of a LEGO block:

- Any LEGO block is combinable with any other LEGO block
- LEGO blocks can be assembled in any manner you choose
- LEGO blocks are so fun and simple that anyone can put them together

The implicit assumption (carried by the metaphor) that these three properties are also properties of learning objects is leading those of us who care about the success of this endeavor down a path to somewhere else. As I have said before, if what results from the combination of learning objects is not an *instructionally useful* unit, said combination has failed regardless of whatever else it may do. It is my belief that a system of learning objects with these properties cannot produce anything more useful than LEGOs themselves can. The selection of another metaphor for learning objects demonstrates this with some clarity.

The Natural Learning Object

Instead of making something artificial (like a LEGO) the international symbol for "learning object," let us try something that occurs naturally, something about which we already know a great deal. This should jump start our understanding of learning objects

and the way they are put together into instructionally meaningful units. Let us try the atom as a new metaphor.

An atom is a small "thing" that can be combined with other atoms to form larger "things." This seems to capture the major meaning conveyed by the LEGO metaphor. However, the atom metaphor departs from the LEGO metaphor in some extremely significant ways:

- Not every atom is combinable with every other atom
- Atoms can only be assembled in certain ways prescribed by their structure
- Some training and understanding are required in order to assemble atoms

Let us review these implications one at a time.

The search for a useful learning object system is complicated enough without the requirement inherited from LEGO-type thinking that every learning object be compatible (or combinable) with every other learning object. This requirement is naïve and over-simplistic, and if enforced, will keep learning objects from ever being instructionally useful.

The search for a useful learning object system is also hindered by the idea that learning objects can be combined in any manner one chooses. (According to http://www.lego.com/, six of the standard 2x4 LEGO blocks can be combined in 102,981,500 ways.) This is what is currently described in our field as "theory neutrality." Software vendors and standards bodies describe their learning object related work as being "instructional theory neutral." Were this the case all would be well in learning object land. Problematically, a more accurate description of their products is "instructional theory agnostic," or in other words, "we don't know if you're using an instructional theory when you combine these learning objects or not, and we don't care." It is very likely that the combination of learning objects in the absence of any instructional theory will result in larger units that fail to be instructionally useful.

Finally, the search for a useful learning object system is stuck in the idea that anyone should be able to "open a box of learning objects" and have fun assembling them with their three-year-old. While I have no desire to make the assembly of learning objects difficult for the sake of it, the notion that any system developed should be so simple that anyone can successfully use it without training (like LEGOs) again seems overly restrictive. In other words, it seems to take the science out of instructional science.

The three LEGO properties of learning objects point toward a trend about which I have written elsewhere: the tendency to treat learning objects like information objects. While no two people may be able to reach a common definition of instruction, I believe that most would agree that instruction is more than information, as David Merrill is so fond of reminding us. In what ways is it more than information? That depends on the particular philosophies, learning theories, and instructional theories to which you prescribe. However, it should be clear to see that learning objects in the absence of the

philosophy, learning theory, and instructional theory that differentiate instruction from information are only information objects, and are not worthy of any other title. The learning object field must quickly make up its mind: are we in the information business or the instruction business?

Answering tough questions

When we decide that we are about the business of instruction and take atoms as the new learning object metaphor, questions that were once difficult to answer become transparent. Perhaps the most difficult and persistent question asked of learning object evangelists like myself is "what degree of granularity is the most appropriate for instructionally effective learning object combination?" One answer can be found by examining the atom metaphor more closely. (Pushing a metaphor is risky business because all comparisons break down at some point; however, this is useful as a properly contextualized educational exercise.)

It is commonly accepted that atoms are not the smallest bits of stuff in the universe. Atoms are in fact combinations of smaller bits (neutrons, protons, and electrons), which are combinations of smaller bits (baryons and mesons), which are combinations of even smaller bits (quarks, anti-quarks, and gluons), etc. Curiously, it is the particular manner in which these top-level smaller bits are combined in an individual atom that determines which other atoms a particular atom can bond with.

Applying all this to learning objects, even though there may always be an argument about how small a learning object could actually be, we may still effectively combine learning objects that are themselves combinations of smaller bits (such as text, images, and audio clips) without deciding the argument. It would also seem that these smaller bits may naturally be combined in such a manner that promotes one learning object's combination with another, while the same structure prevents the first object's combination with a third. One answer to the granularity question, then, is the level of aggregation at which the learning objects display this characteristic. This response is a generalization of my earlier responses regarding the need for instructional architectures.

Atomic bonding is a fairly precise science, and although the theories that explain it are well understood (albeit probabilistically) at the macro-level of neutrons, protons and electrons, they are understood less well at the levels of the smaller bits. (While the smaller bits are an area of curiosity and investigation, this does not prevent fruitful work from occurring at the macro-level.) Similarly, instructional science has its theories that function probabilistically at a high level, while less is understood about the exact details of the smaller instructional bits. (Here again, fruitful work continues to occur at the higher level while lower level explorations are being carried out.) It should be painfully obvious at this point that a person without understanding of instructional science has no more hope for successfully combining learning objects into instruction than a person without understanding of chemistry has of successfully combining atoms into a crystal.

Conclusion

Those interested in learning objects have succeeded in evangelizing their cause by the use of metaphors that have made learning objects seem nice, warm, and fuzzy. Disappointingly, we seem to have begun believing our own press. It is time for the admission that learning objects are not information objects, and that there is as desperate a need for theory in our field as there is in chemistry or physics. Rather than thinking about LEGOs or Lincoln Logs, perhaps our minds should be pointed toward something like a "learning crystal," in which individual learning objects are combined into useful structure.