**Assessment Assuming Complexity**

Gordon Rowland

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Why do many of us resist articulating and measuring Student Learning Outcomes (SLOs)? Do we faculty members not want to know if intended goals are achieved? Do we not wish for our work to be evaluated? Do our egos lead us to believe that we have comprehensive knowledge of our disciplines and mastery of teaching? Or is it just a matter of human nature to resist change?

Maybe there is a sliver of truth in one or more of these answers, but there might be more fundamental reasons. For example, we humans do not resist change (e.g., our students pay a small fortune to be intentionally changed by their education). Rather we resist change that is imposed on us. But again, is it simply the imposition that causes our reaction, or is it a matter of what is being imposed?

Here are a few other possible reasons:

• SLOs tend to be constructed in a way that limits the range of what is assessed and emphasizes the predictable and known. This may happen because the predictable and known are easier to evaluate and defend, or because faculty members lack the training or resources to assess more complex goals. Regardless, in at least some contexts, such simple goals are secondary.

• Ideally assessment would lead directly to course and curricular improvement, but in practice it is often an entirely separate effort. Frequently, for example, results are not even reported to those who could make changes. Resistance in this case isn’t just to SLOs; it is to all forms of assessment.

• By focusing on the predictable and known, assessment is difficult to align with an institution’s mission, which is often broad and abstract.

• Perhaps as a consequence of the reasons above, assessment often does little to foster serious reflection on instructional purposes or processes.

The first of these reasons—the limitation of range of SLOs—may be at the root of others, and is, therefore, the focus of this essay. I argue that the limited range of outcomes being assessed in an approach that is heavily focused on simple SLOs is preventing assessment from being widely accepted and useful in practice. As a first step, it may help to examine where simple SLOs are readily applied and helpful, and where they are not.

**Different Contexts**

There are programs and aspects of courses and curricula for which precise, simple SLOs make sense. For example, in a pre-professional program there may be basic skills and knowledge that a practitioner is required to possess. These can and should be specified and measured, and when not obtained, some sort of action taken (e.g., course revision). In fact, an even stricter adherence to format and style than is typical of SLOs might be called for in these circumstances. For example, performance objectives might be required, with action verbs that are observable and measurable, statements of the conditions under which performance would occur, and meaningful standards.

In other contexts, different goals are primary and are difficult to predict and articulate. For example, some look at higher education more as an exploration of the unknown than a duplication of the known, making it awkward if not impossible to predetermine outcomes with any specificity. In these contexts, faculty members’ greater reward is students coming to see the world in new ways, rather than a majority of them accepting a predefined perspective. Of greater value are the surprises, the new insights that emerge, and the achievements that surpass our expectations, more so than the repetition of facts. SLOs can be written for these types of goals, but in practice they are often seen by assessment committees as unsatisfactory (e.g., unmeasurable). Alternative approaches are necessary.

**The simple and the complex**

Thinking about the range of schools, colleges, and universities, and the various motivations of faculty members within them, the contexts and goals described above can be seen as ends of a continuum. Appropriate approaches to assessment at the ends will be quite different, starting with their underlying assumptions and characteristics.

At one end of the continuum is the logic of simple learning systems, those in which specific outcomes can be determined and articulated beforehand, suitable instructional methods selected to match, and quality measured solely with respect to the predetermined outcomes. This is an appropriate match to vocational education and job training environments where the knowledge and skills required for performing a repetitive task are clearly known. That’s not to say that such tasks are necessarily easy; on the contrary, some may be very difficult and require enormous amounts of practice. But the nature of the learning system is simple, and we can thus be systematic in its design, for example, follow a linear process model.

In contrast, while students may need to acquire certain skills and bodies of knowledge in order to solve known and well-defined problems in a domain, some goals for them go well beyond. The problems students will need to solve and the processes and tools they will need to develop to solve them are not yet known. The multi-dimensional (e.g., cultural, technological, social, economic) environments in which students will work and live will be different from those in which current understandings developed, and mastering known subject matter will be insufficient. Consequently, educational goals are very different. For example, we now seek to foster rich reflection, an ability to learn continuously through a lifetime, and deep knowledge in a specialty along with an ability to communicate across disciplines. Such goals reveal an increasing convergence between professional and liberal education, and they are better matched by a logic of complex learning systems.

The logics of simple and complex learning systems can be compared along a variety of dimensions such as those below. The result is an articulation of two worldviews in terms of ontological beliefs (what we believe to be the nature of reality, or how the world works), epistemological assumptions (how we come to know and learn), and methodological choices (how we think and act based on these beliefs and assumptions).

Comparing assumptions and characteristics of learning systems

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|  | **Simple** | **Complex** |
| **Ontological Beliefs** |  |  |
| system  | Systems are in the world and can be observed objectively. We can know their nature and thus be systematic in operating and/or influencing them. | Relationships exist in the world, but a “system” is what we call a system. It is our construction. We can gain insight by modeling systems from multiple perspectives, but we need to recognize that the models are our interpretations and sustain this reflective skepticism.  |
| predictability | Desired outcomes can be known beforehand, expressed, and measured. Behavior can be predicted. | Important outcomes are novel, surprising, unpredictable, and often emerge over long periods of time. Behavior can be understood in retrospect. |
| linearity | Outcomes are proportional to inputs (linear) and result from simple cause-effect relations. | Outcomes are non-proportional to inputs (non-linear) and result from mutual causality. |
| determinacy | Outcomes are determined by conditions and inputs (determinate). | Many outcomes are possible (indeterminate) and are highly sensitive to initial and dynamic conditions. |
| **Epistemological Assumptions** |  |  |
| learning  | acquisition of relevant skills and knowledge; higher-level goals are attained by accumulation (additive process); top-down transfer from teacher to student | emergence of new understanding and capabilities; insights are gained through connections (synergistic/transformative process); bottom-up emergence from interaction |
| achievement | a measurable performance resulting from simple cause-effect relationships (e.g., giving incentives to teachers leads to greater learning by students)  | an emergent outcome of mutually causal relations among teachers, students, and others |
| accountability | centralized, top-down, hierarchical (e.g., accountability is appropriately defined in terms of instructor responsibility for student learning); individuals are independently accountable | mutual: many stakeholders are accountable to one another; they interdepend  |
| motivation | teachers are employees, motivated by extrinsic rewards from employers (e.g., through incentives, threats of punishment) | teachers are intrinsically motivated, e.g., by a sense of professional responsibility |
| primary system level (i.e., focus of attention) | instruction | student learning experience |
| attitude toward deviation from expectations | anticipated outcomes are desirable; goal is to diminish gaps and to focus (e.g., on the planned content) | surprise is desirable; goal is to expand, to open minds, and enrich the T (i.e., deepen the I and broaden the T of T-shaped individuals) |
| **Methodological Choices** |  |  |
| control/guidance of learning  | firm control is necessary and desirable; avoid distraction and waste by imposing constraints along prescribed dimensions (time, space, topics, etc.) | minimal control and sensitivity to feedback can enhance learning; seek to guide learning with flexible and productive constraints in the moment; search for opportunities |
| approach to improvement | assess learning outcomes and revise methods where necessary (i.e., test out error, close the loop); tie incentives to performance on standard measures; mold behavior of both students and teachers through directives (sticks and carrots) | experiment; reward risk taking (to innovate, achieve breakthroughs, open the inquiry); build trust by granting autonomy; invest in professionalization; build spaces for collaboration and networking to spread ideas  |
| appropriate process | systematic development | systemic design |
| rigor | focused, disciplined adherence to accepted methods | sustained openness to changing one’s mind and to profound moments of newfound clarity |

Adopting a simple or complex worldview leads to different indicators of quality, as shown below.

Indicators of quality

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|  | **Simple** | **Complex** |
| product/outcome | effectiveness: the degree to which predetermined goals (e.g., performance standards) are achieved; uniformity  | emergence of greater complexity (e.g., synergies); uniqueness of outcomes, novelty/surprise; simultaneous strengthening of identity and transformation; degree of diversification (requisite variety); richness of relationships (perhaps from increased conversations) |
| process | efficiency (e.g., time and resources) | evolution: adaptation and long-term survival; sensitivity; openness; positive attitude/relationship to risk; purpose seeking |
| attitude (of key participants) | affect (e.g., student reactions) | level of commitment (e.g., to sustainability, or perhaps thrivability, flourishing, or betterment of the system) |

As is likely obvious from these comparisons, assumptions of simplicity or complexity will lead to very different approaches to assessment—what is assessed and how. And again, there is nothing inherently wrong with using either approach, for example, using simple indicators for those learning goals that are indeed simple in nature[[1]](#footnote-1). However, this is not only a question of appropriateness; it is one of priority. An exclusive logic of simple learning systems leads to a prioritization of simple predetermined outcomes. It will likely lower expectations and limit aspirations. Consequently, a move toward complexity, or rather, toward a broad range of complementary approaches is warranted.

**Complementary Approaches**

Precisely what assessment using the logic of complex systems would involve is not entirely clear to me, but I can imagine directions. It may help to model relevant simple and complex learning systems.

If simplicity is assumed, then a model might be constructed to reveal the relations among three primary stakeholders: administration, faculty, and students (see below). In this example, administration is responsible for assigning teaching duties and providing resources to faculty; faculty members are responsible for defining goals and criteria, planning and providing instruction, and evaluating performance of students; students are responsible for studying and demonstrating accomplishments to faculty; faculty are responsible for documenting teaching and student achievement to administration. While not strictly determinate, assuming the causal logic of this model would make assessment using simple SLOs a reasonable approach.



Example of causal logic of simple learning systems

If, on the other hand, one assumes complexity then a model might reveal interdependent relations, perhaps in some senses mutual causality, among many stakeholders (see below).



Example of parts and relationships of complex learning systems

The second model may come closer to capturing the nuances of learning system(s), but it is certainly intimidating. The typical response to the intimidation, that is, to the complexity, is to reduce and simplify, for example, to slice away the parts and relationships thought unessential, and to convince oneself that this will focus efforts wisely. Essentially, this would mean seeing the first example above as an appropriate simplification of the second.

How else might we conceive of assessment, in a way that embraces rather than reduces the complexity? A possibility is to conceive of assessment as evolutionary guidance, essentially an effort to guide the evolution of complexity rather than to test for and correct errors in a simple system.

Evolutionary guidance would involve seeking to simultaneously (1) understand and strengthen the whole system(s)—to strengthen its identity, and (2) guide it to become more rather than less complex—to foster its transformation. Strengthening identity could be a matter of determining and strengthening parts and, more so, relationships, with a central concern of how they contribute to the whole. Fostering transformation, in creative tension with the strengthening of identity, could involve sensitivity to internal and external signals (e.g., feedback from relationships and changes in the environment), openness to new ideas and adaptation, and purposeful design action (e.g., imagining ideals and approaches that might lead to them).

As an example, the stakeholders in the second model above can be considered system parts. Each part or stakeholder group would strengthen itself by engaging in a reflexive cycle. For example, the faculty is strengthened by selecting, mentoring, and evaluating its own members. The relationships would then be strengthened by asking how each group is or should be accountable to others, and focusing efforts accordingly. The emphasis would be on two-way relationships and mutual accountability. For example, accreditors responding to the ideas and desires of institutions, not just institutional behavior shaped by accreditor demands, and an on-going conversation rather than periodic review. In strengthening both parts and relations, the central concern would remain contribution to the whole, so close attention to how goals and efforts can be better aligned, say, with the college mission.

Assessment in this approach, rather than an effort to prove the attainment of static goals, would be an inquiry into how value could be added to parts, relationships, and the whole. It would be characterized by experimentation rather than routine measurement, by “what if” questions rather than “if then” prescriptions. It would involve intentional perturbation making the emergence of new order possible, rather than by feedback and control systems designed to maintain the status quo. In this sense, assessment would be a tool for conscious evolution—for not only getting better at what is already done, but for developing as a system, in the same way that we hope our students will develop as learners. And in focusing on the whole, the larger picture would be given priority, for example, evaluating teaching effectiveness based on the long-term impact for alumni as opposed to simple SLO achievement and immediate reactions (student statements) in courses.

Importantly, there is potential for such assessment to not be another tacked-on responsibility, but to be an integral part of everyday activity, for example, to be intertwined with course development. What would be necessary, though, is re-emphasis on trust and professional responsibility[[2]](#footnote-2), and, where necessary, reward systems that are aligned with the approach. For example, with respect to the evaluation of teaching this might mean evidence of adaptation, creativity, and risk taking, not just mastery of basic skills.

**An example – IC2**

Those thoughts are all well and good in the abstract. What would evolutionary guidance, and the sort of complementary approaches along a continuum, actually look like in practice? Below is an initial application in a program I co-direct with my colleague Jason Hamilton.

The IC2 (Ithaca College Integrated Curriculum) Project began in 2009 as an integrative learning demonstration project. It involved creating a set of four one-credit mini-courses titled Integration, Insight, Creativity, and Character. The project has been very successful, and as of spring 2018, over 100 sections have been co-taught by 49 instructors from all schools at the college to over 1800 students.

Over the nine years, we have engaged in fairly extensive course evaluation and continual course development. However, existing outside of the five schools at the college, we have not (yet) been required to conduct programmatic assessment. This unique situation has allowed us to approach assessment in a different manner.

On the one hand, we do seek to promote specific skills and knowledge associated with integrative learning, and the final assignments of our courses are reasonable well matched to the AACU VALUE rubric in this area (see below). Thus, we have readily available evidence that can be used to gauge the attainment of criteria, and this evidence can be included in program and accreditation reviews.

Final course assignments mapped to AACU's VALUE rubric for integrative learning

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| **VALUE rubric** | **IC2 assignment** |
| **Connections to experience**Meaningfully synthesizes connections among experiences outside of the formal classroom (including life experiences and academic experiences such as internships and travel abroad) to deepen understanding of fields of study and to broaden own points of view. | **ICIC 10000 Integration** **Part 1. Field notes.** Sometime in the next day or so, review any notes you took over the weekend and any other artifacts you have from the course. Then this coming week, throughout each day, take notes as you go about your day, on how the information/experiences/new ways of thinking from this weekend have altered your perspectives and ways of thinking. Make notes a least 3 times a day.**Part 2. Essay.**Using your field notes write an essay of at least 600 words that summarizes all these notes and experiences and offers a final reflection on how the exercises for this course have helped you see the world in a new way. |
| **Connections to discipline**Independently creates wholes out of multiple parts (synthesizes) or draws conclusion by combining examples, facts, or theories from more than one field of study or perspective. | **ICIC 12000 Insight** **Synthesis model.** Create a single representation using graphics, words, objects, sounds, etc. that affords an interdisciplinary view of [the course topic]. This representation should simultaneously distinguish and synthesize the perspectives of all of our guests. In other words, this representation should allow one to see similarities and differences among views, and, when taken as a whole, give a complete perspective of [the course topic] that cannot be gained by looking at the various views separately. Bring the representation and a one-page explanation to our final class. |
| **Transfer**Adapts and applies, independently, skills, abilities, theories, or methodologies gained in one situation to new situations to solve complex issues in original ways. | **ICIC 13000 Creativity** **Proposed solution.** Choose a new, unsolved, complex problem. Describe how one might approach this new problem creatively. Propose a creative solution to the problem. If the problem is too complex for a solution to be explained briefly, describe the seed of your creative solution and how it approaches the problem in a new way. In your description, explain several steps of your creative process. |
| **Integrated communication**Fulfills the assignment(s) by choosing a format, language, or graph (or other visual representation) in ways that enhance meaning, making clear the interdependence of language and meaning, thought, and expression. | **ICIC 12000 Insight** **Synthesis model** (see above) |
| **Reflection and Self-Assessment**Envisions a future self (and possibly makes plans that build on past experiences) that have occurred across multiple and diverse contexts. | **ICIC 14000 Character** **Self-reflective essay.** Describing and explain your current character traits, answering these types of questions: What kind of person are you? How did you get to be that person? Perhaps start with ideas and stories that come to mind as you reflect on your own character. Draw on the work we've done together in the class. For example, what habits of thought, feeling, and action do you have? What mental models do you use to formulate your understanding of how your character works? Put into writing the insights into your character that you've had over the past few weeks as we've worked together. **Action Plan.** Then create an action plan for how you will seek to develop your character in the near-term and long-term future. For example, how will you nourish character traits you view as positive and diminish traits you view as negative? How will you change your habits and maintain the changes? |

On the other hand, our goals for the project go beyond the achievement of specific skills. For example, we hope that co-teaching the courses will help instructors foster integrative learning in their other courses, leading ultimately to curricular innovation and perhaps a cultural change at the college (e.g., a lowering of silos).

Consequently, we seek evidence associated with complexity, such as emergent outcomes, surprise, simultaneously stronger identity and transformation, diversification, richness of relationships, evolution, sensitivity, openness, risk taking, purpose seeking, and sustainability. We ask each pair of co-instructors to

provide short narrative responses that apply these complexity criteria, simultaneous to examining the final assignments with respect to the SLOs (i.e., VALUE rubric). We trust the instructors to do this themselves since we are assessing the courses, not the instructors. We are also in the process of modifying student course evaluations to include self-reports of emergent outcomes, risk taking, and so on.

We also ask instructors to share their impressions—both general and specific to course activities—and to self-report on innovations that they attempted: What new ideas did you have? What new activities or variations did you try? With what results? Lastly, we ask where outside the mini-courses instructors have incorporated content and methods that foster integrative learning.

Unique to the IC2 Project, we have been able to devote the equivalent of four credits per year to course development and improvement. Pairs of faculty members seek to improve one course per term, so a two-year cycle.

They begin by convening the instructors of the course being developed, assessed, and/or improved prior to the term for a conversation on goals, evidence, new ideas, and so on. They examine the assessments that instructors have completed and the student course evaluations from the previous three semesters, and they interview individual instructors with respect to the course, the course Instructor Guide, and the overall project. Then they prepare a revision of the Instructor Guide to be used for the next two years. Assessment is thus an integral part of on-going formative evaluation.

Simultaneous to these course-focused efforts, we (the project directors) plan to look at programmatic outcomes, that is, consider the larger system. As suggested earlier in the description of evolutionary guidance, this may involve developing and strengthening a conceptual model of the project as a system (e.g., a model composed of purposes, core values, key parts, key stakeholders, key relationships, important perspectives). Potential indicators of the strength of system parts and relations will likely include faculty responses, faculty outcomes, scholarship and instructional design, student reactions, learning outcomes, enrollment, resource use/efficiency, planning effectiveness, cultural change, public awareness, and community and societal impact. Polling alumni with respect to long-term outcomes is another possibility. Our design actions will be guided by evidence in these areas and by the goals of adaptation and sustainability.

**Conclusions**

The examples above are actually close to how our college's accreditor (Middle States) and authors on SLOs envision assessment in the ideal. Practice, at least the practice I have observed, tends to be quite different. A widespread approach similar to the one we are using in IC2 would serve to inform faculty regarding the attainment of both simple and complex goals, and perhaps more closely align efforts with school and college missions. Assessment would be appropriately framed in terms of course development and improvement, and serious reflection on what is happening in the classroom would be fostered. Also, the output of the effort would flow directly into program review, that is, program review would involve only a periodic documentation of what had been accomplished on an on-going basis.

In sum, SLO-focused assessment tends to encourage a narrow, uni-dimensional, simplistic approach to accounting for phenomena that are at least partly complex. A broader approach can and should be adopted. Embracing the logic of complex learning systems, perhaps in combination with that of simple learning systems, offers the opportunity for worthwhile and enriching dialogues rather than meetings and outside efforts that most of us would rather avoid. This shift requires effort, but as a former student once told me, we can recover quickly from burnout; we can never recover from cynicism.

1. An argument might be made that "authentic assessment" embraces complexity, given that the instructional strategies tend to have greater fidelity with respect to the context where skills and knowledge are applied, and thus tend naturally to be more complex. However, an examination of the underlying logic—determining what a student should be able to do then selecting instructional strategies to match—reveals the logic of simple learning systems. Higher-level learning goals, perhaps, but simple causal logic. [↑](#footnote-ref-1)
2. See the concept of "intelligent accountability" in education. [↑](#footnote-ref-2)