Designing DiscoTests

The scale

Learning and the skill scale

Over a century of cognitive developmental research (Baldwin, 1894; Piaget, 1985; Case, 1985; Fischer, 1980; Commons, et. al. 1998) has shown that learning cannot be explained simply as the accumulation of knowledge. Learning clearly involves qualitative change. Over the last 10 years, Dawson and her colleagues have modeled and compared the qualitative changes described by several researchers (Dawson-Tunik, Commons, Wilson, & Fischer, 2005), and have found that the skill scale described by Fischer provides the most useful account—in terms of informing applied work—of the levels through which learning progresses.

The Lectical™ Assessment System (LAS)

Fischer's skill scale describes 13 qualitatively distinct developmental levels (0-12). The LAS describes scoring rules for levels 6-12 (13 is hypothetical). To determine the developmental level of a verbal performance, LAS analysts examine the structure of its arguments and the level of abstraction of the elements embedded in these arguments. Then, to determine the phase of the performance (:1-:4), analysts examine the degree of elaboration of these structures and elements. The "ruler" on the right shows most of these levels and phases. The LAS has been extensively validated (Dawson-Tunik, Commons, Wilson, & Fischer, 2005).

References

Baldwin, J. M. (1894). Mental development in the child and the race (Reprinted by Augustus M. Kelly, 1968 ed.). New York: MacMillan.

Case, R. (1985). Intellectual development: Birth to adulthood. New York: Academic Press.

Commons, M. L., Trudeau, E. J., Stein, S. A., Richards, S. A., & Krause, S. R. (1998). Hierarchical complexity of tasks shows the existence of developmental stages. Developmental Review, 18, 237-278.

Dawson-Tunik, T. L., Commons, M. L., Wilson, M., & Fischer, K. W. (2005). The shape of development. The European Journal of Developmental Psychology, 2(2), 163-196.

Fischer, K. W. (1980). A theory of cognitive development: The control and construction of hierarchies of skills. Psychological Review, 87, 477-531.

Piaget, J. (1985). The equilibration of cognitive structures: The central problem of intellectual development (T. Brown & K. J. Thampy, Trans.). Chicago: The University of Chicago Press.

Describing learning sequences

Data

To describe learning sequences, we first conduct probed, domain specific, clinical interviews with a diverse sample, usually covering an age-range from 5 to middle adulthood. The ideal sample is composed of 30-50 individuals from each level (6-12), distributed well across phases. We often re-sample until we have an appropriate distribution of levels.

Scoring

We score the interviews for their skill level with the LAS, treating each probed response as a scoring unit and averaging the results.

Coding

The LAS functions like a developmental ruler, ordering performances according to their skill level, but on its own, it does not provide any information about that performance's conceptual content. The relation between conceptual content and skill level is determined by conducting an independent (blind) analysis of the conceptual content of scored performances. These analyses are often exhaustive, in that we try to capture all of the possible ways in which people conceptualize each major theme of a domain or subject area.

Describing learning sequences

Skill level scores and content are then integrated into detailed descriptions of reasoning on each theme at each phase. These descriptions provide the basis for *low-inference coding rubrics* that become part of stand-alone assessments. These rubrics can be employed by teachers and students. Descriptions also provide the basis for *learning recommendations*. Students are directed toward learning materials and activities one or two phases above their current level of performance.

Discotests

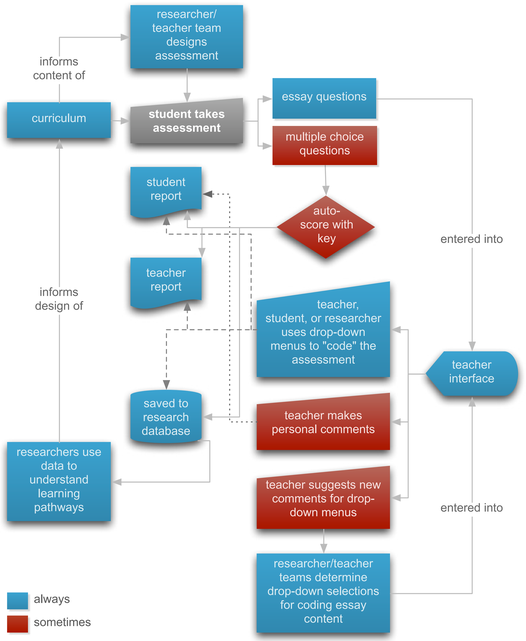
Applying what we learn

Once learning sequences have been thoroughly researched and described, the results form the basis for stand-alone developmental assessments and curriculum recommendations. To distribute these assessments and conduct the research required to produce additional assessments, Dawson and her colleagues have founded DiscoTest.

All DiscoTests are designed to shift the focus of assessment from *memorization* to *thinking and understanding*. They are free to public high school teachers and their students.

DiscoTests double as research instruments, allowing researchers to constantly refine our understanding of learning within particular domains and subject areas.

The flow chart on the right shows how the DiscoTest system works.



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