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Field Notes

(i.e. Notes from a field; you are advised to watch where you are putting your feet.)

Current Thinking on the Model of Education

(The papers that follow were originally presented in symposium form at the meeting of Canadian Learned Societies at Vancouver in May 1983. They are remarkable in having been contributed by authorities from a variety of fields, all claiming to support the same radical conclusion. Each paper brings with it not only the authentic smell of the lamp, however, but also a distant whiff of will o' the wisp. Anyone who succeeds in making sense of these papers is probably making a mistake. But let the authors speak for themselves, as they unfortunately have undertaken to do.)

Introduction

An examination of the rise of great ideas of our Western Civilization reveals that historic turning points in the evolution of thought are best recognized in retrospect. Thus this symposium takes on added significance because not only does it represent a turning point in the evolution of educational thought but also it is so obviously a giant step forward that the judgment of history need not be awaited. This series presents nothing less than The Model of Education. We fully anticipate that it will stand undiminished for at least one-half of a millenium.

In the first three papers, we demonstrate psychological and methodological breakthroughs which have allowed development of The Model and show its grounding in more traditional curriculum theory. The fourth contribution presents The Model itself, which, as the reader will note, is set in a frame-work of all previous knowledge. The final presentation offers necessary and sufficient empirical evidence for the validity of The Model.

The Harmonic Dissonance Theory of Maturation

Alan G. Ryan

The Model of Education requires a developmental theory as one of its foundations. When The Model was being conceived, various developmental theories, such as those of Piaget and Kohlberg, were evaluated and found wanting. Among the reasons for discarding prior theories were (a) that they provided too few stages for such a complex event as child development, and (b) they were unnecessarily limited in that they sprang only from observations of children. A developmental theory capable of anchoring The Model of Education must have its roots deep in the fibre of Western Civilization. Accordingly, the harmonic dissonance theory of maturation has been developed.

The theory

The harmonic dissonance theory of maturation has been formulated from the observation that children develop according to a pattern which has a parallel in western music. The most perfect relationship between two notes in music is the octave. When the child starts its development, it begins on one "note", so to speak, and when it has fully developed, it has "grown" an octave. Now, if the fundamental note (the one from which the organism starts) and any one of the other notes in the octave are played together, either a dissonance or a harmony will result. The harmonic dissonance theory is a stage theory, as outlined in Table 1.

Table 1

Harmonic Dissonance Theory of Maturation

Notes Played Together	Dissonance or Harmony	Approximate Age
C & D	Dissonance	In Utero
C & E	Harmony	Birth-2 yrs.
C & F	Dissonance or harmony	2-5 yr.
C & G	Very harmonic	5-11 yrs.
C & A	Imperfect harmony	11-14 yrs.
C & B	Dissonance	14-17 yrs.
C & C	Perfect harmony	18+ yrs.

Some amplifications on the stages in the table are now presented:

C & D. A dissonance stage when the infant causes sickness and

discomfort in the mother.

- C & E. An harmonic stage, when the child is good-natured and well-adjusted. This is the period of the first smiles and the preliminary walking activities.
- C & F. At various times this interval has been treated as either a dissonance or a harmony. This ambivalence perfectly captures the child beginning its journey of exploration and experimentation.
- C & G. Next to the octave, this interval is the most harmonic in music, corresponding to a period of stable growth where a child is good-natured and is progressing at an even pace.
- C & A. An imperfect harmony, neither perfectly harmonic nor absolutely dissonant, corresponding exactly to the unsettling onset of adolescence.
- C & B. Undoubtedly the most dissonant interval. The child is firmly launched into adolescence with all its unsettling overtones. The abrasive nature of the adolescent is perfectly captured by this dissonant interval.
- C & C. Once again, perfect harmony has been attained. The child has now developed into a new person and the development process can be considered complete.

As we have demonstrated, this timeless and useful theory can explain most of what is observed during the development of the human being. For example, the interval from C to B flat (which is not a major interval of the theory, but one of the several minor ones) is the diminished seventh, the chord of which will be recognized by any composer as an easy way to prepare for a change in key. In other words, the adolescent is preparing to move to a new key, or, in lay terms, to a new frame of reference.

There are, of course, a few observations which do not fit this simplified version of the theory. When Piaget was faced with such instances, he had to invoke the unwieldy concept of **décalage**. In the harmonic dissonance theory of maturation, any untoward observations can easily and naturally be accommodated by the additional concept of **glissando**, which is a moving from note to note without identifying the interval in between the notes.

The Harmonic-Dissonance Theory of Maturation represents a powerful new developmental theory. It accounts for a large mass of data. It is embedded in a wide cultural vision, and it is highly plausible. These merits will allow the theory to supplant other developmental theories in the minds of educators and thus ensure that it takes its rightful place as an inspiration

for future generations of educational research.

Collective-Recollective Methodology: An analysis of a teacher's day

Philip Nagy

This paper presents a new approach to the problem of reliability of data in classroom-observation, case-study approaches. It builds upon recently pioneered work in collective-recollective methodology. Its strength rests in the combining of the richness and validity of qualitative data with the precision and reliability of matrix algebraic methods. This combination we have dubbed anthro-algebra or matrix ethnography.

In review, the essence of collective-recollective methodology is to look back upon experience as perceived by a group and attempt to agree on what has happened. In our example, the group participating consisted of one "observed" and 16 "observers". The observed was a classroom teacher of junior high science and geography in a large urban system. The goal of the project was to help the teacher understand and reconstruct the working day of Tuesday, March 9, 1982. The observers were a group of graduate students selected for their understanding of the critical methodological issue - that their grades in a graduate seminar depended on the success of the method.

Our crucial methodological breakthrough is to place the observers in a square pattern, resembling a matrix. During the lesson, observations are recorded by the observers and placed on a matrix-shaped coding sheet. Next, each observation is assigned an arbitrary numerical code, which then occupies the observation space in the matrix. Thus, a page of notes is quickly and efficiently converted to a data matrix.

The reason for choosing a square seating arrangement (a circle has been the traditional organizational motif) is to allow for easier inversion of the observer matrix. Following this, by a slight extrapolation of the usual techniques, we are able to extract Eigen-observations. A simple clustering procedure gives a rough draft of Eigen-paragraphs, and minor editing to smooth out differences in writing style gives the finished product.

In a trial example, the group watched the teacher teach a lesson on river deltas. In the recollective session the next day, the majority of the group were able to recall the topic from rough notes. This is considered primary evidence for the validity of our procedures.

Development of the method is not complete. We are currently experimenting with incorporating the views of the observed teacher in a manner analogous to the uniqueness vector.

There are two methodological problems which have come to our attention. One, ironically, occurred in a situation where

there was too much agreement among the observers. This resulted in collinearity of the observation matrix, which then could not be inverted. Fortunately, this problem in fact contributes to the validity evidence of this technique. The case under discussion occurred in a school where the seats were bolted to the floor, resulting in students having too similar education experiences. In these conditions, the fact that the observation matrix could not be inverted simply confirms that the observer matrix couldn't either.

The final problem with our method is that the placing of sixteen observers in a classroom leaves no room for students. We are currently working on this problem, using the latest available microtechnology.

A Metaphor for Canadian Curriculum Change

Dianne L. Common

What was novel becomes commonplace, its past forgotten, and metaphor fades to mere truth.

Nelson Goodman

There is, in Canada, one special curriculum tradition which deserves examination, that of the curriculum "fix". Curriculum fixing is the practice, well engrained in the Canadian educational establishment, of providing a curriculum panacea, delivered from the policymaker to the student through the teacher. Our examination of this phenomenon and its evolution will be through the use of a most appropriate metaphor, that of a caffeine fix, as delivered from the grower through the food corporation to the drinker. Through this metaphor, this way-of-viewing, we can discern three models of curriculum fixing, or implementation, as some might call it, paralleling three modifications in the process of infusing the bloodstream with caffeine.

Traditional coffee drinking, if we limit our hindsight to thirty or so years, parallels the top-down approach of traditional curriculum fixing. Coffee beans are conceived and grown by remote growers, just as curriculum problems are perceived by those far removed from the consumers at the end of the production line. Multinational food and publishing corporations play similar roles, in the selection of beans (materials), and in their processing and packaging. The fact that local labour is sometimes involved in this step does not ameliorate the essentially foreign domination of the industry. At the consumer level, choices are limited to the most minor tinkering with the Idea (or the Bean).

While for many years coffee consumers were satisfied with buying pre-selected and pre-ground beans, teachers were also happy to have store-bought pre-packaged solutions to their curriculum problems. In recent times, thanks to the

simultaneous development of Local Needs, Canadian Nationalism, and the Coffee Boutique, the grip of the top-down curriculum and caffeine fixing traditions has been loosened. As consumers are now more inclined (and able) to select and grind their own coffee beans, resulting in a more personalized fix, teachers are now more able to select and individualize their own solutions to their curriculum problems.

Let us not overemphasize the degree of actual loosening of the ties that bind; a glance at the recent Council of Ministers document for comparing provincial courses of study shows remarkable similarity across the country. This is parallel to the discovery that the charming Fred's Bean Emporium down the street is in fact a chain, located in every shopping centre from Squamish to Come-By-Chance, and owned by a subsidiary of United Amalgamated.

However, the most interesting developments in curriculum are paralleled by those who choose to get their caffeine from alternatives, that is, tea or cola beverages. This may be compared to the advent of the Local Curriculum Team, who, rather than making an individualized selection from the offerings of the multinationals, actually write their own materials for school or board use. In all honesty, the parallel breaks down somewhat at this point. A better metaphor might involve those who reject caffeine entirely in favour of something which can be grown in their own backyard. (Interesting parallels can be drawn concerning violations of copyright laws.)

In summary, then, the evolution of caffeine fixing habits can be used to draw parallels to the evolution of curriculum changing practices. This outline has been the merest sketch of the possibilities open to those who choose metaphors with wisdom and aplomb. Let me leave you to consider the metaphorical possibilities in the fast-food business and in real estate speculation.

The Model of Education: An organic approach

Glen S. Aikenhead

Stephen Toulmin's classic philosophical treatise, *Human Understanding*, developed a definitive and comprehensive explanation of rational thought; a philosophy of human rationality, if you like. To explain all of human rationality within one modest volume, Toulmin drew upon the biological metaphor "evolution", illustrating that human rationality shares a metaphysical pre-supposition with biological modes.

Similarly, Aikenhead has postulated a conceptualization of education vividly captured in a biological model of the cell. With every nuance of a cell's structure and function, fresh insights into education emerge with a vengeance. The biological cell is the existential quintessence of Canadian education.

For example, the conservative self-preserving character of education is commensurate with the homeostasis of the cell. As

documented by Ryan, "Education's robust resistance to change is manifested by the multifarious cellular systems that maintain chemical equilibrium within the cell;" to which Hersom has replied, "Ryan is full of multifarious cellular systems."

Let us look more closely at the structure of the cell and discover further relationships with Canadian education. The cell's first distinguishing feature is its outer membrane. This selectively permeable barrier clearly defines the custodial function of education, so eloquently conceptualized by John Dewey when he said, "Education keeps the little bastards off the street." The purpose of a cell is to take in the unsophisticated and unruly amino acids, fats, and minerals in order to produce literate and useful proteins that will serve the host cell or build other cells. These proteins are commonly excreted into the public domain via the cellular membrane.

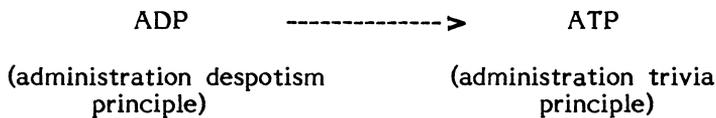
The cell's second distinguishing feature is its nucleus and cytoplasm. They direct the cell's protein synthesis in a way that offers researchable insights into Canadian education. The nucleic structure metaphorically represents the function of the university. Within the nucleus, the academic heredity of education resides specifically in the carnal chromosomes. These blueprints to Truth are composed of giant DNA molecules which are structured in the form of a double helix - one for each sex. DNA is a sequenced thread of four Arts and Science nucleotides; instructor, assistant professor, associate professor, and full professor.

The cellular mechanism by which all knowledge flows from the nucleus university may be seen by following the messenger-RNA, a less than perfect DNA representing the faculty of education (professors). The messenger-RNA, a species synthesized in the nucleus, develops curricula within the regulated jurisdiction of the DNA. Then the messenger-RNA diffuses into the cytoplasm of the nonuniversity education world.

The cytoplasm has its own structures. Let us begin with the endoplasmic reticulum on which the ribosomes are situated. The conceptualization of classroom instruction is clarified by the ribosomes. Here the messenger-RNA from the nucleus university forms a template. Meanwhile, a lower form of RNA, "transfer-RNA" - the real work horse of the cell - captures the unruly, witless molecular species of amino acids that the cell membrane permitted to penetrate in the first place. These unruly molecular species represent the state of unsocialized academic ignorance which education is destined to serve. The uneducated become attached to their transfer-RNA teachers, and are brought to the ribosomes where, with the educational psychology of enzyme action, these amino acids are synthesized into proteins, using the curriculum messenger-RNA as a template. This organizing or socializing function flows naturally from both the psychology of enzyme action and the structure of the DNA Truth. Notice that this organic model of education molecularizes students' states of literacy, not the students themselves.

This quantization of literacy respects the individuality of students while augmenting the requirements of accountability to the general public outside the cellular membrane, and thus reduces the usual analytic flack freely flowing from departments of educational foundations.

The general public supports the educational system by financing a budgeted supply of oxygen. This oxygen easily penetrates the cellular membrane and enters into another cytoplasmic structure, the mitochondria. Within the mitochondria the respiration of education takes place, consuming oxygen and excreting carbon dioxide and other stale entities; but all the time changing ADP into the more energy rich ATP, according to the equation:



The mitochondria have long been recognized as the throne of educational administration where circular flow charts abound, championed by the Nobel prize winning Krebs cycle. The energy metabolism of ATP is crucial to all energy systems throughout the cell. According to Farquhar et al's (1986) nasal degeneracy theory, when the cell's energy metabolism fails, putrefaction sets in.

A last cytoplasmic structure worth mentioning is the lysosome. This is where the cell's enzymes are synthesized. Note that enzymes masquerade as clever proteins and thus attain the metaphorical status of educational psychology. The lysosome model of educational psychology breaks down the arbitrary distinctions among cognitivists, behaviourists, Rogerians, and Rotarians. The model of education acknowledges psychology as playing a unique enzymatic role for each educational function within the cell. The model also acknowledges the fact that no education model without a favourable psychology bent has a chance at SSHRC funding.

The test of a good model is its ability to explain diverse phenomena, its fruitfulness in opening new avenues of research, and its ability to accurately predict empirical events. The Model of Education has demonstrated novel explanations for everyday events and has boggled the intelligentsia with new research questions. The Model needs only to be validated by empirical methods before it reaches the educational pinnacle of Aikenhead's curriculum vitae.

Validation of the Aikenhead Model Using an Holistic Judgment Strategy

R.A. Yackulic

Validation of an holistic theory, such as the Aikenhead

Model, constitutes a major challenge for theory builders. Although education is rich in methodology for validating measures, variables, and constructs, strategies for validating rich nomothetic networks have yet to be developed. Meta-analysis, and its subsequent generalization as mega and super analysis, while reasonable first attempts at large-scale validation strategies, are not without flaws.

A major shortcoming of existing theory-validation strategies is the criterion of a singular truth. That is, most validation strategies assume a single reality, and that a good theory is maximally congruent with reality. Given the developing state of educational theory, a more appropriate goal might be the interpretation rather than absolute representation of reality as is the case in more mature disciplines. Since a single set of events may give rise to a variety of interpretations, a theory-validation strategy should incorporate the possibility of pluralistic realities.

The Aikenhead model and similar holistic theories tend to be of the portrayal type, capturing reality at a particular time and from a particular perspective. Changes in either time or perspective might be expected to change the portrayal. The task, therefore, for theory validation is identification of those theories which facilitate "good sense making" and allow public verification. This paper elaborates such a validation strategy and includes results of the Aikenhead Model validity examination.

An exhaustive review of research methodologies uncovered two strategies for exploring the sense-making and verification attributes of holistic theories. Both strategies are based on the premise that absolute truth may never be known but that situations require "temporary truth" (or current best guess). One strategy, rooted in the American psyche, employs the adversarial court model. This approach pits a theory prosecution team against a theory defense team. Each team presents the best evidence for its position. Judgment of the theory's merits is left to a single wise man.

The second strategy has Canadian roots and reflects the consensual approach. This strategy - which in its most developed form is known as the Royal Commission Model (RCM) - involves close examination of a theory by a group of wise men. The wise men are initially naive vis-à-vis the theories under review. Following their examination they are asked to express a consensual judgment regarding the theory's sense-making worth. This consensus constitutes public verification.

In addition to addressing the central tasks of theory validation, RCM has several major strengths as a strategy: (1) it is very efficient and should result in major economies over models which try to find definitive tests of "truth"; (2) theory validation can be greatly accelerated - it should be possible to quickly evaluate theories wherever wise men gather; (3) the process should result in accelerated theory revision.

The Aikenhead Model was evaluated using the RCM. Fifteen history professors unversed in educational theory were asked to examine the Aikenhead theory and six others which would provide a context for interpreting the results. The theories assessed were: Ideal theory (left to each professor to define), Newtonian mechanics, Copernicus' astronomy, Einstein's Relativity, Reaganomics, Trudeau's Just Society, and Aikenhead's Model. The professors were unaware that the Aikenhead Model was the focus of attention. The Aikenhead Model was presented to each professor along with a three-sentence summary of each of the remaining theories. Table 2 gives a sample of theory summary.

Table 2

Einstein's theory

The author describes various elements in the universe and questions the adequacy of previously postulated explanations. Basing his conclusion on a complex single subject involving chalk and blackboard, the author postulates various abstract inter-concept relationships. Suggestions for further research are offered. However, some aspects of the model appear to be untestable.

Professors were asked to construct an individualized rating form and to then rate each of the theories. Theory evaluation and data collection were completed in 56 minutes (approximately 8 minutes per theory).

Following standardization by professors, the data were analyzed using Carroll and Chang's Individual Differences scaling procedure. Five dimensions were identified: love/hate, understand, simple/complex, coherence, and testability at 43, 36, 7, 5, and 4% respectively. The remaining two dimensions, interpreted as logical adequacy and congruence with reality, seemed to have minimal impact on the final solution.

As is readily apparent from a cursory examination of Figure 1, the five-dimensional theory space, the Aikenhead Model did not fare well. On dimension "I" (love/hate) the Aikenhead Model scored far from the ideal theory; only Reaganomics and Trudeau were rated lower. Aikenhead was similarly rated low on dimension "II" (understandability), dimension "III" (simplicity), and dimension "IV" (testability). On each of these dimensions the Aikenhead Model was rated lowest or second lowest of all the theories. The only favourable rating obtained by Aikenhead was on dimension "V" (consistency, congruence). In general, the Aikenhead Model joined

Reaganomics and Trudeau's Just Society as examples of poor theory. The ideal theory and Newtonian mechanics were recognized by the professors as theories rich in sense-making value.

INDSCAL also allows judging styles to be examined. Four groups of professors emerged: Group I seemed to favour the love/hate dimension; Group II, understandability; Group III, both understandability and love equally; and Group IV, dimensions III through VII. Post hoc analysis of demographic data revealed geographic patterns: Group I professors were all employed either in B.C. or Maritime universities; Group II in the Golden Triangle; Group III were from Memorial, while Group IV were from the Prairie region. Apparently, desirable theory attributes are a function of geographic location. Seemingly only Prairie professors value the attributes of traditional scientific theories.

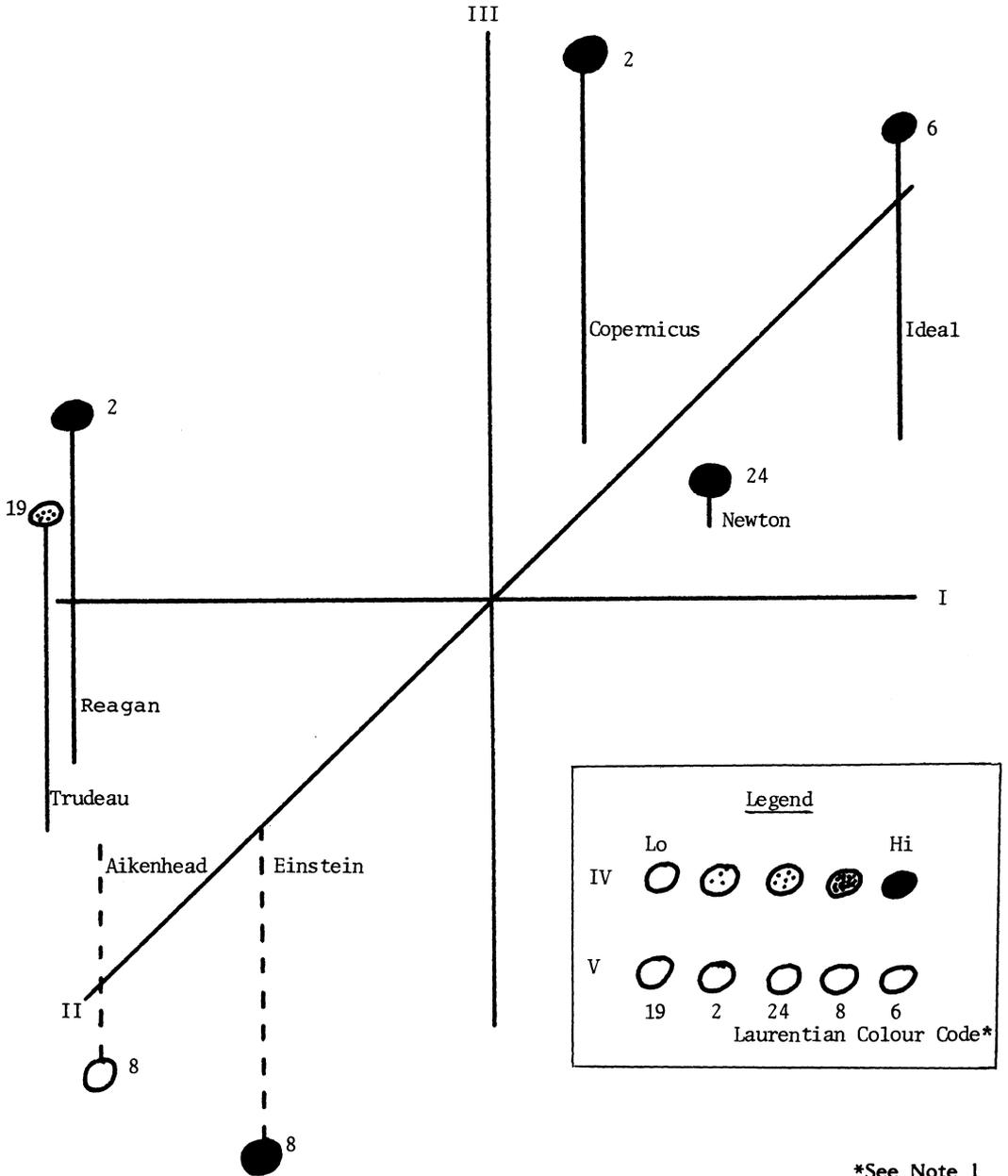
RCM is an effective strategy for evaluating complex holistic theories. It is efficient and provides readily interpretable results.

The Aikenhead Model when subjected to RCM evaluation did not fare well. Major revisions to the model appear necessary. Aikenhead's major deficiencies seem to be in the lovableness and understandability area. Its simplicity and testability also warrant attention.

Note 1

Printing limitations have precluded full colour reproduction of this graph. Nonetheless, the missing dimension V may be readily added by the reader. Dimension V is represented by colour. The numbers adjacent to each balloon (and in the legend) refer to Laurentian Coloured Pencil colour codes. Although dimension V is portrayed pentamously here, further research may permit exploration of the full colour spectrum. Since the first draft of this paper was written the author has developed a scale which implements the full 24 Laurentian Coloured Pencil set. Details are available from the author.

Figure I: 5-Dimensional Theory Space



*See Note 1

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