

Confirmation of Caswell's 1952 "Significant curriculum issues" using mathematical logic

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Abstract: From Caswell's seminal paper of 1952, we evaluate 11 significant curriculum issues, then group them into the arbitrary categories of: (1) Learner-Learned (p,q); (2) Accountability of school (r,s,t); (3) Unit of value (u,v,w); and (4) Identity of process (x,y,z). We do not assume weighting factors, so as to avoid AI networking issues. We evaluate the conjecture that (3) implies (2) implies (4) implies (1). The conjecture as rendered is confirmed as tautologous. Therefore Caswell's hypothesis is elevated to a theorem. What follows is that mathematical logic can be a useful approach to verify curriculum issues and extended in the field of education.

We assume the method and apparatus of Meth8/VL4 with Tautology as the designated *proof* value, **F** as contradiction, **N** as truthity (non-contingency), and **C** as falsity (contingency). The 16-valued truth table is row-major and horizontal, or repeating fragments of 128-tables, sometimes with table counts, for more variables. (See ersatz-systems.com.)

Variable	Assignment
p	The learner as the student receiving curriculum
q	The learned as the teacher imparting curriculum
r	Responsibility of the school
s	Role of the school in the community
t	Capacity of the school for needs of all, extended opportunities
u	Economical unit value as driver ed, occupational ed
v	Political unit value as democracy, fascism & socialism, monarchy, republic
w	Relational individual value as counseling of unstable, family unit ed, sex ed
x	Identity of the planner.
y	Identity of the elements as planned.
z	Identity of the educational plan.

LET: \sim Not, \neg ; + Or, \vee , \cup ; - Not Or; & And, \wedge , \cap ; \ Not And;
 $>$ Imply, greater than, \rightarrow , \vdash ; $<$ Not Imply, less than, \in
 $=$ Equivalent, \equiv , \vDash ; @ Not Equivalent, \neq ;
 $\%$ possibility, for one or some, \exists , \diamond , M ; # necessity, for every or all, \forall , \square , L ;
 $(p=p)$ **T** as tautology; $(p@p)$ **F** as contradiction;
 $(\%p<\#p)$ **C** as contingency, Δ ; $(\%p>\#p)$ **N** as non-contingency, ∇ ;
 $\sim(y < x)$ ($x \leq y$), ($x \subseteq y$).

From: Caswell, H. L. (1952). Significant curriculum issues.
Association for supervision and curriculum development. NEA.

We group variables defined from Caswell's selections as affecting curriculum into four categories:

- (1) Learner-Learned (p, q);
- (2) Accountability of school (r, s, t);
- (3) Unit of value (u, v, w); and
- (4) Identity of process (x, y, z).

We assume no variable or category is weighted, as in AI expositions.

We make arbitrary assumptions in applying the implication operator as follows.

For (3), the political unit implies the economic unit implies the individual value. (5.1)

$$((v>w)>u) = (p=p) ;$$

$$\mathbf{FFFF FFFF FFFF FFFF (6)}, \mathbf{TTTT TTTT TTTT TTTT (10)} \quad (5.2)$$

For (2), the role of the school in the community combines with the responsibility of the school and combines with the capacity of the school. (6.1)

$$((s\&r)\&t) = (p=p) ;$$

$$\mathbf{FFFF FFFF FFFF FFFF (8)}, \mathbf{FFFF FFFF FFFF TTTT (8)} \quad (6.2)$$

For (4), the identity of the elements planned combines with the identity of the planner and combines with the identity of the educational plan. (7.1)

$$((y\&x)\&z) = (p=p) ;$$

$$\mathbf{FFFF FFFF FFFF FFFF (112)}, \mathbf{TTTT TTTT TTTT TTTT (16)} \quad (7.2)$$

For (1), the student combines with the teacher. (8.1)

$$(p\&q) = (p=p) ;$$

$$\mathbf{FFFT FFFT FFFT FFFT (128)} \quad (8.2)$$

For the student implies the teacher: (9.1)

$$(p>q) = (p=p) ;$$

$$\mathbf{TFTT TFTT TFTT TFTT (128)} \quad (9.2)$$

We proceed to build this conjecture:

For $((3) \& (2) \& (4) \& (1)) > (p>q)$, if the values combine with the accountabilities and combine with the identities and combine with the student and teacher, then if the student implies the teacher. (10.1)

$$((((v>u)>w)\&((s\&r)\&t))\&((y\&x)\&z))\&(p\&q))>(p>q) ;$$

$$\mathbf{TTTT TTTT TTTT TTTT (128)} \quad (10.2)$$

Eq. 9.2 as rendered is tautologous. Therefore our conjecture of Eq. 9.1 is confirmed, and Caswell's significant curriculum issues, presented as a hypothesis, are now a theory.