A MODEL FORASSESSING THE LEARNING BENEFITS IN COOPERATIVE EDUCATION

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Introduction

In recent years there has been considerable concern in the cooperative education community regarding the relatively limited role of cooperative education in higher education in North America. In 1985, these concerns resulted in the Cooperative Education Association (CEA) establishing an ad hoc committee, *Cooperative Education and the Curriculum.* Ryder (1987) suggests that the trends in educational reform and a return to the "basics" in education pose a challenge to the growth and vitality of cooperative education. He contends that many practitioners in higher education consider that cooperative education is not academically legitimate, that it is applied, vocational and anti-intellectual in nature, and is thereby not consistent with traditional educational values. The CEA ad hoc committee (Heinemann, 1988) has echoed this view as, in general, cooperative education functions outside the mainstream of American higher education. As identified by van der Vorm (1988), the ad hoc committee gave three major reasons for cooperative education remaining on the periphery of higher education:

1. Faculty do not recognize work as a vehicle for learning and, in fact, view cooperative education as anti-intellectual;
2. Co-op practitioners see themselves as operational people concerned with logistics and administration - not as educators; and
3. Cooperative education methodology for promoting learning is vague and underdeveloped.

The Committee gave four recommendations for action:

1. Conduct more research;
2. Develop criteria for program quality, standards, and ethics;

3. Expand professional development efforts for the cooperative education community; and
4. Expand dissemination of information on cooperative education.

These suggestions are well founded, but special care must be taken to address the concern that co-op is anti-intellectual and is not consistent with traditional academic values. It is not sufficient just to conduct more research. The research must be placed in the context of existing and traditional educational learning theories, thereby bringing co-op closer to the educational mainstream. In this paper we propose an approach that examines the educational benefits of cooperative education in the context of contemporary learning theories. This approach should allow for the development of research demonstrating that cooperative education enhances, not weakens, the intellectual learning process. It should be noted that this does not require the development of a specific theory for cooperative education with regard to learning, but rather the interpretation of cooperative education within a conceptual framework, with associated tenets, derived from contemporary theories of learning. Such a framework, regarding the process of learning, should provide a context for explaining research findings concerning the educational outcomes of cooperative education, and could assist in planning future research addressing the effects of variation in co-op practice on the process of learning.

Current Status

Previous attempts have been made to link cooperative education outcomes to theories of learning. These links were created to show that the co-op process is related to good educational practice, but they have had relatively limited explanatory power. The landmark research of Wilson and Lyons (1961) related cooperative education practice to the educational theories of Dewey (1949), which hypothesized a beneficial relationship between experience and learning. A number of subsequent studies (eg. Smith, 1965; Lindenmeyer, 1967) have shown a small but significant advantage for co-op students with regard to academic progress (grades and retention rates). These benefits have not been shown explicitly to be the result of the nature of co-op practice or of any specific characteristic of the co-op process. As Wilson (1989) stated, with reference to the results of studies on academic progress of co-op students: "These are interesting observations, but without some reasonable explanation they do not really help us to understand the educative force of cooperative education, nor do they help us to plan even more effective learning experiences for participating students (p. 42)."

To convince those who view co-op as anti-intellectual and for co-op to be accepted as an effective educational strategy, it must be explained why co-op students show better academic progress than non-co-op students. More recently,

in the cooperative education literature (Wilson, 1987; Fletcher, 1989) there has been discussion of links between co-op education practice and contemporary learning theories. These discussions are based implicitly on the ideas of, for example, Bandura (1978), Gagné (1985) and Wittrock (1979), concerning the ways in which learning occurs and may be enhanced. These discussions need to be extended to provide a framework for the links to be empirically established. This framework must include consideration of the nature of the educational practice, the learning outcomes and the traits of the learner.

Wilson (1987) and Fletcher (1989) have both called for such an approach. Fletcher has suggested the development of a theoretical framework unique to cooperative education, and to begin this development, the outcomes of co-op research need to be linked to existing theoretical models. This process was initiated by Wilson (1987), who provided an analysis of the characteristics of co-op. He suggests that this process ties the elements of co-op practice to learning principles. The following is an attempt to build upon this analysis by establishing a more formal relationship with educational theory. In addition, a context will be provided for the investigations which have been conducted to date, and areas for further study will be suggested.

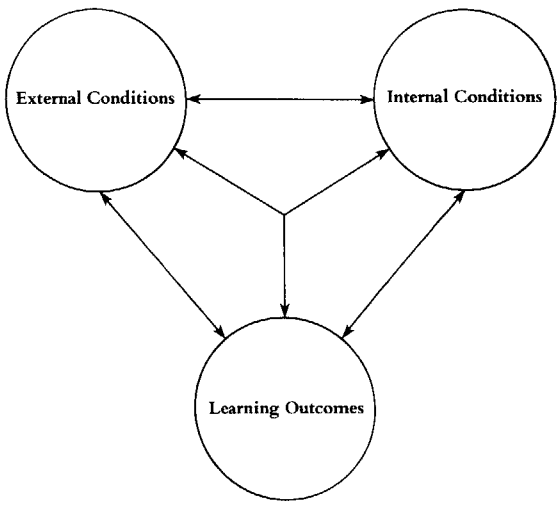
A General Model of Education and its Theoretical Base

It is generally accepted (Gagné, 1985) that a comprehensive model of education has three critical components:

1. *Internal conditions* refer to the learner's perspective and cognitive processes. These are the beliefs, values and ethics of the learner as they interact with what the learner thinks, feels and does.
2. *External conditions* refer to stimuli from the environment such as place and events of instruction, instructional activities and methodologies.
3. *Learning outcomes* are those outcomes identified by Gagné (1985), as verbal skills, intellectual skills, motor skills, and cognitive strategies and are in keeping with the educational goals alluded to earlier in this paper.

These components are interactive and their interaction operates to modify the three components on an ongoing basis, (Fig. 1). It is through modifications to the external conditions that the teacher or program designer can alter the educational process, and through changes to these external conditions the learning outcomes and internal conditions are modified in an iterative manner. As internal states and learning outcomes are altered by the effect of changing the external conditions, the teacher or program designer has an opportunity to further adjust the external conditions. The ideal educational strategy would be to adjust the parameters that can be changed (external conditions) so as to produce conditions which are optimal for learning to occur (internal states and learning outcomes).

Figure 1
Three Components of the Learning Process



What is most important about the model is that the educational process is viewed as multidimensional which, as Ryder (1987) has stated, is a necessary characteristic of a theoretical model to support the operation of the cooperative education program.

The principles of learning, derived from contemporary theory in learning and cognition, provide the conceptual underpinnings of this model (Foster, 1986, Table 1). Each of these principles relates to either the internal or external conditions and/or to the interactions between the three components of the model (Fig. 2).

The specific educational program design determines the extent to which the principles of learning are implemented and consequently the states of the components of the model and their interactions. Therefore, the effectiveness of the educational program design may in part be evaluated by assessing the opportunity that it provides to put into operation the principles of learning. For example, examine the principle of practice (Principle 1, Table 1). A program design that provides for practice in support of learning includes the opportunity to interact with excellent role models, engage in the actual practice of what has been learned, and mentally practice what has been learned. Practice is an important variable in learning, and if a program provides sufficient opportunity (ie., suitable external conditions) for practice in the three ways previously mentioned, learning outcomes will be enhanced.

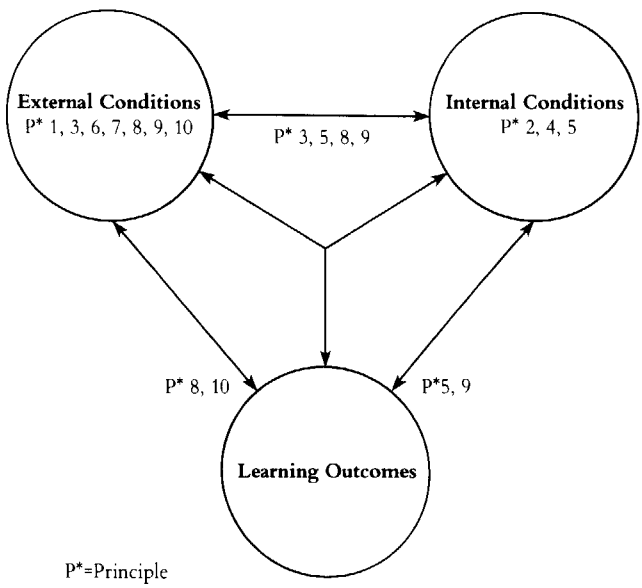
Table 1
Ten Principles of Learning*

Principle

1. **Practice:** We learn to do by doing, by instruction in and by images of doing and through observation (Guthrie/Bandura/Gagné**).
2. **Internal Context:** We learn to do what we practice and this is a good predictor of what we will do in a similar situation (Guthrie/Rychlak).
3. **Reinforcement:** Reinforcement is important in the mediation of learning but only to the extent that it is relevant to the individual and to the situation (Thorndike/Bandura/McKeachie).
4. **Learning Styles:** Sequential readiness to learn is important for simple tasks and for children but the knowledge structures of adults may develop in a non-linear and uneven fashion (Ausubel/DeBono).
5. **Self-Efficacy:** What a person learns depends upon the person's perceptual organization of the situation and upon the person's perception of self (Gestalitists/Bandura/Marton).
6. **Modes of Practice:** Practice is important to learning and learning is enhanced if the types of practice are varied so that they activate more than one brain centre (Thorndike/Paivio/Whittrock).
7. **Transfer:** Transfer of learning increases with task similarity and the degree to which new learning may be "anchored" in exisiting cognitive structures (Judd/Osgoode/Ausubel/Gagné).
8. **Learning to Learn:** Learning can be intentional as well as incidental and includes the process of learning to reason intentionally which guides action and hence learning (Lewin/Tolman/Anderson/Marton).
9. **Motiviation to Learn:** External incentives are only effective in mediating learning in relationship to their relevancy and value to the individual (Bandura/Farley/Humphries and Revelle).
10. **Retention of What is Learned:** The key factors in retention are practice and meaningfulness (Flavell/Paivio/Whittrock).

* Adapted from Foster (1986)
** See Foster (1986) for primary references

Figure 2
Learning Principles Applied to the
Three Components of the Learning Process



To restate how the components of the model, the principles of learning, and program design and operation relate to each other: two components of the model (internal and external conditions) interact to produce learning (learning outcomes). The quality, quantity, and rate of learning are a direct result of the internal and external conditions. The state of the learning outcomes component also has an effect on the other two components. Hence, the model is recursive in nature. The states of the components are characterized by the principles of learning. The application of the principles of learning is determined by the program design and modes of operation. The ideal educational program design would be one that provides for the optimal application of all the principles of the learning process.

Relationships between Cooperative Education Program Design and Principles of Learning

The fundamental assumption of the model is that certain types of educational practice will support the application of the learning principles. Because of the multidimensional nature of the model, it should be expected that this can be achieved through a range of different modes of practice, but it should be anticipated that certain modes of practice will be better than others. Therefore, a major thrust

of cooperative education research should be directed to the question of whether cooperative education practice supports the application of the learning principles better than other modes of educational practice.

Answering this question is made more difficult partially because there is no general agreement as to the standards for cooperative education program design and operation. As Heinemann (1988) notes, except for the Cooperative Education Division of the American Society for Engineering Education and the Canadian Association for Co-operative Education, there are no established certification standards. However, there are some aspects of cooperative education programs that are generally, if not formally, agreed upon. In the following, three program characteristics which encompass those described by Wilson (1987), are proposed as examples to illustrate the relationship between co-op practice and the application of the principles of learning outlined in Table 1. Most cooperative education programs include work experiences that are:

1. Related to and integrated with the academic experience;
2. Productive (i.e. the student is directly involved in the work and not merely an observer);
3. Supervised or monitored by personnel from the academic institution and by knowledgeable individuals in the work place.

From these three aspects of the cooperative education program a number of consequences result. These consequences may be defined in terms of the educational model and lead to the development of general hypotheses regarding the efficacy of cooperative education programs in achieving the implementation of the learning principles, as compared to non-co-op programs.

1. *Program Characteristic:* Work experience relates to and integrates with the academic experience.
   a. Possible consequences for external conditions:
      (1) Opportunity to apply what is learned during the academic terms;
      (2) Opportunity to assess methods and techniques used on the work terms on return to classroom.
   b. Some learning principles in operation (From Table 1):
      (1) Principle 1 — Practice.
      (2) Principle 7 — Transfer.
      (3) Principle 10 — Retention.
   c. Generated hypotheses:
      Co-op students, whose work terms meet condition (1), should retain more information, from both their work and course experiences, and be able to apply the information more effectively than non-co-op students. This should result in co-op students displaying better

performance on tests designed to measure such factors as problem solving ability and/or ability to apply knowledge to practice.

2. *Program Characteristic:* Work experiences are productive.
   a. Possible consequences for external conditions:
      (1) Students contribute to their host organization in a productive fashion.
      (2) Students are acknowledged for their contribution by their employers and by the academic institution.
   b. Some learning principles in operation (From Table 1):
      (1) Principle 5 — Self-efficacy.
      (2) Principle 9 — Motivation.
   c. Generated hypotheses:
      Co-op students may have greater confidence, may perceive themselves to be more capable and should be better motivated than non-co-op students. Given that motivation, confidence and a positive self-image all contribute to the capacity of the individual to acquire and use knowledge, co-op students should do better on tasks which require deductive and inductive reasoning, processes which are indicative of a high level of learning (DeBono, 1983). In addition, increased self-confidence and motivation should be displayed in personal and work-place behaviors, such as increased certainty regarding career goals and greater independence.
3. *Program characteristic:* Work experiences are supervised by personnel from the educational institution and by knowledgeable individuals from the work place.
   a. Possible consequences for external conditions:
      (1) Feedback to the student is relevant and appropriate.
      (2) Provision of knowledgeable role models.
      (3) Academic staff, who have supervised student work terms, are able to bring to the classroom current and relevant examples to expand concepts.
   b. Some learning principles in operation (From Table 1):
      (1) Principle 3 — Reinforcement.
      (2) Principle 4 — Learning Styles.
      (3) Principle 6 — Modes of Practice.
      (4) Principle 8 — Learning to Learn.
   c. Generated hypotheses:
      Co-op students should receive feedback which is relevant to their learning situation more frequently than non-co-op students. Co-op students should be exposed to a variety of learning situations which will evoke a range of learning styles. The work experience should

provide a greater opportunity to observe role models. Because of these factors co-op students should have an advantage relative to non-co-op students in the acquisition of knowledge and the development of higher level thinking skills. These factors should also produce increased realism and the realization of the need for good communication and interpersonal skills.

The three hypotheses generated illustrate how the model may be used to create a basis for future research and to aid in the interpretation of existing research data. If the co-op program design does provide improved opportunity for the application of the learning principles (Table 1), then at least some, if not all of the hypothesized effects, should be observable.

Relationship to Existing Research

Clearly, the existing research into cooperative education has addressed some of the proposed hypotheses and can be discussed in the context of the model. The model provides a connection between the outcomes of past research. Several studies (e.g. Cornelius, 1978; Wilson, 1974) have investigated aspects of personal growth, including how students feel about themselves, their self-confidence, their level of independence, and their awareness of the importance of good interpersonal skills. Taken together, the results of these studies indicate that co-op students have a high level of self-esteem and self-efficacy. These attributes are reflected in the internal states component of the previously described educational model.

Another group of research studies indicates an academic advantage to co-op students. Investigations of academic progress have looked at Graduate Record Test scores (Wilson and Lyons, 1961), or academic grades (e.g. Smith, 1965; Lindenmeyer, 1967; Gore, 1972) and at retention rates (Smith, 1965; Stark, 1965; Lindenmeyer, 1967). These findings describe some aspects of the learning outcomes component of the model, as do studies which have addressed confidence in career choice (Weinstein, 1980), or realism in job expectations (Brown, 1984: Wilson, 1974).

The third component of the model, external conditions, must be characterized, in all this research, as the practice of cooperative education. A theoretical connection between the research on personal growth, academic benefits and career orientation is provided by Bandura's social learning theory (Bandura, 1978), which predicts that high levels of self-esteem lead to improved learning outcomes. The connections between the external conditions and the learning outcomes, and between the internal states and external conditions are provided, in part, by the principles of transfer, reinforcement, and retention (Table 1). The general co-op program design, that has the program characteristics described above and by Wilson (1987), appears to contribute to the implementation of the learning principles, and hence to the improvement of learning outcomes

and internal states. However, from past research we cannot be certain whether the observed effects result from the general features of co-op or from certain specific aspects of the co-op program design. Nonetheless the research questions posed in the past can be revisited within the context of the proposed model with a view to establishing the relationships amongst the learner, learning outcomes and co-op practice.

Conclusion

In this paper we have proposed a model to explain the enhanced learning which occurs in cooperative education and is based on accepted educational theory. Research on cooperative education may be interpreted in terms of this framework to demonstrate that the practice of cooperative education does in fact support traditional educational values. As Fletcher (1989) has suggested, there is a need for investigation to, ". . . further specify the moderating variables." (p. 31) In the present context this means research to identify those variables in co-op practice which allow for the optimal application of the learning principles. If future studies conducted are interpreted in the context of existing educational theories, then it may be possible to demonstrate that cooperative education is part of the educational mainstream and thus facilitates its acceptance by the educational community.

References

Bandura, A. 1978. The Self System in Reciprocal Determinism. *American Psychologist* 33:344-358.

Brown, S. J. 1984. *The Influence of Cooperative Education on First Job After Graduation.* Ph.D. dissertation, Boston College.

Cornelius, C. 1978. *Florida Community College Student Self-perceptions Related to an Initial Semester of Participation in a Cooperative Education Program.* Doctoral dissertation, University of Florida.

DeBono, E. 1983. The Direct Teaching of Thinking as a Skill. *Kappan* 64:703-708.

Dewey, J. 1949. *Experience in Education.* New York: McMillan.

Fletcher, J. K. 1989. Student Outcomes: What Do We Know and How Do We Know It? *Journal of Cooperative Education* XXVI(1): 26-38.

Foster, F. S. 1986. Ten Principles of Learning Revised in Accordance with Cognitive Psychology: With Implications for Teaching. *Educational Psychology* 21:235-243.

Gagné, R. M. 1985. *The Conditions of Learning*, 4th ed. New York: Rinehart and Winston.

Gore, G. 1972. New Evidence of Co-op System Relevancy. *Journal of Cooperative Education* VIII(2):7-14.

Heinemann, H. N. 1988. Cooperative Education and The Academy. *Journal of Cooperative Education* XXIV(23):109-119.

Lindenmeyer, R. S. 1967. Comparative Study of the Academic Progress of the Cooperative and Four Year Student. *Journal of Cooperative Education* III(2):8-18.

Ryder, K. G. 1987. Meeting the Challenges and Opportunities of the Next Decade. In *Cooperative Education in a New Era* by K. G. Ryder, James W. Wilson and Associates, pp. 304-316. San Francisco: Jossey-Bass.

Smith, H. S. 1965. The Influence of Participation in the Cooperative Program on Academic Performance. *Journal of Cooperative Education* II(1):7-20.

Stark, M. H. 1965. *An Appraisal of the Work-Study Programs at Wilmington College and the Cooperative Industry.* Doctoral dissertation, Colorado State College.

van der Vorm, P. T. 1988. Response to the Preliminary Report of the Ad Hoc Committee on Cooperative Education and the Curriculum. *Journal of Cooperative Education* XXIV(2-3):120-124.

Weinstein, D.S. 1980. *Cooperative Education Strategies and Student Career Development.* Cooperative Association Research Monograph No. 1. Boston: Cooperative Education Research Center, Northeastern University.

Wilson, J. W. and Lyons, E. H. 1961. *Work-Study College Programs.* New York: Harper and Brothers.

Wilson, J.W. 1974. *Impact of Cooperative Education Upon Personal Development and Growth: Final Report to the Braitmayer Foundation.* Boston: Cooperative Education Research Center, Northeastern University.

Wilson, J. W. 1987. What Students Gain from Cooperative Education. In *Cooperative Education in a New Era* by K. G. Ryder, J. W. Wilson and Associates, pp. 269-284. San Francisco: Jossey-Bass.

Wilson, J. W. 1989. Assessing Outcomes of Cooperative Education. *Journal of Cooperative Education.* XXV(2):38-45.

Wittrock, M.C. 1979. The Cognitive Movement in Instruction. *Educational Researcher* 13:15-29.