

Quality Indicators for Teacher Training in Canada

R.A. Yackulic
B.W. Noonan
University of Saskatchewan

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Introduction

The purpose of this paper is to identify the indicators of a successful teacher education/educator preparation programs. These indicators are a composite of the factors that could be considered as components of any teacher education program. The purposes of the indicators include:

- a) To provide policy makers and program planners with information on the important, measurable components of teacher education programs.
- b) To provide a framework for accountability of programs to stake holders and to the general public.
- c) To provide a framework for discussion on necessary and preferred elements of teacher/education preparation.
- d) To provide a framework for discussion on the preferred knowledge, skills, and attitudes of future teachers/educators.

The paper is organized as follows. First, there is a brief discussion on the generally accepted knowledge base for teacher education. Second is an overview of the basic principles and practices of indicator systems, particularly with respect to education. The third section is a description of an exploratory study that may form the basis for a teacher education indicator system and some implications of such a system.

Before examining the underlying elements of teacher education it should be emphasized that teacher education has been the subject of a well-documented international reform movement for the past decade or more. The Holmes Reports in the United States have stimulated more than a decade of debate over teaching and teacher education (see, for example, Mayes, 1998). More recently the international teacher education journal *Teaching and Teacher Education* (1999) devoted a special issue to documenting teacher education reforms in six countries on four continents. These reforms have taken many directions though it is probably too early to determine if there has been a substantive move away from the principles of teacher education. Whatever the effect of these reforms, there is now and will continue to be a generally accepted framework for teacher education in Canada. It is not the purpose of this paper to consider what teacher education may look like in the future though that is certainly an important topic for Council of Ministers of Education Canada (CMEC) and for teacher training institutions. However, in order to address the purpose of this paper, (e.g. the place of indicators in teacher education programs) it is necessary to outline briefly some current assumptions about the training of beginning teachers.

Elements of a teacher education program

As background for an examination of indicators in teacher education, it is necessary to outline briefly those generally accepted elements of a teacher education program. The first source of such information lies in the knowledge base (or conceptual framework) that guides most teacher

education. There is abundant research and opinion on the actual or preferred knowledge base which provides information on the underlying constructs that presumably can be measured by an indicator system. The second approach to identifying the elements of a teacher education program is to consider the views of those who currently are responsible for teacher education. Later this paper discusses the perceptions of Deans of Education concerning indicators for teacher education. This provides another type of evidence on how such programs are organized and delivered.

In considering indicators of successful teacher education, there are two distinct but related questions related to teacher education programs, 1) what are the expected knowledge and classroom skills for beginning teachers? and 2) what is the knowledge base for the general design and delivery of teacher education programs? Both questions are related to the generally accepted knowledge base for teacher education that resulted from the education reform movement of the 1980s. As well both questions have generated a vast amount of research and opinion. This paper will focus primarily on indicators addressing the second question. This is not to say that indicators of successful classroom practice are not important; however, such practices presumably are the result of high quality teacher training programs.

The past decade or more of teacher education reform has provided several ideas as to what constitutes a beginning teacher knowledge base. For example, the Council of Ministers of Education Canada (1996) report to the International Conference on Education reviewed a wide range of factors related to teacher education in Canada. With respect to the expected skills for teachers the report noted:

“Teachers need to possess a complex set of interrelated skills. It is necessary to set out as specifically as possible the skills expected of a teacher. Once drawn up this list becomes a valuable tool for preparing pre-service training, for structuring courses, and for assessing the outcomes of training” (p. 27).

Three skill areas 1) discipline skills, 2) psycho-pedagogical skills, and 3) complementary skills were seen to encompass the underlying skills for teaching.

Similar but more extensive knowledge bases for contemporary teacher education have been described by Gore (2001), Christensen (1996), Reynolds (1989), Shulman (1987) and others. For example, Shulman has identified seven categories of professional knowledge and four sources of such knowledge. The seven categories include: content knowledge, general pedagogical knowledge, curriculum knowledge, pedagogical content knowledge, knowledge of learners and their characteristics, knowledge of educational context, and knowledge of educational ends and purposes (p.8). The four sources of that knowledge base are scholarship in disciplines, educational materials and structures, formal educational scholarship, and the wisdom of practice. Gore (2001) advocates a framework rooted in classroom practice with four components; 1) intellectual quality, 2) relevance 3) supportive classroom environment, and 4) recognition of differences. In essence Gore suggests that the knowledge base for teacher education should include the same elements that characterize good classroom teaching.

Other examples of the knowledge base for teacher education are found in two well known publications *Knowledge Base for the Beginning Teacher* (Reynolds, 1989) and *Handbook of Research on Teacher Education (2nd Edition)* (Sikula, 1996). These volumes provide, as much as it may be possible, a codified account of the recommended teachers knowledge base. In essence this knowledge base is the conceptual framework for teacher education program. As such it can be used to develop indicators, expectations and standards for teacher training.

The importance of a generally accepted knowledge base can be seen in issues related to teacher certification and mobility. In Canada, teacher education programs are typically designed to meet provincial/territorial teacher certification. For example, although certification is a provincial/territorial responsibility, procedures are in place for inter-provincial/territorial adjudication such that for all intents and purposes there is mobility for Canadian teachers. Generally speaking one could assume that a basis for such collaboration is that the teacher education knowledge base is similar across jurisdictions. The ongoing development of inter-provincial/territorial teacher certification and mobility is reported in the *Agreement-in-Principle Labour Mobility Chapter of the Agreement on Internal Trade/Teaching Profession* (CMEC 1999).

Recently, some teacher education program initiatives have moved beyond a knowledge base or conceptual framework to the establishment of standards for beginning teachers. For example, the Australian Council of Deans of Education have developed and published national standards for initial teacher education (Australian Council of Deans of Education, 1998). This proposal identifies the 14 attributes and skills for the beginning teacher. As well, the proposal includes nine program standards including: criteria for program development, program staff, facilities, candidate selection, curricula, duration, structure and procedures, teaching and learning approaches, and assessment. This approach, which reframes the knowledge base as a set of expectations, provides a somewhat different framework for teacher education insofar as they are stated as standards rather than elements of a program.

With respect to evaluating teacher education programs, there is a need for information that can help improve ones understanding of a successful teacher education program. Ayers and Berney (1990) have produced a guide for evaluating teacher education that considers a framework similar to that proposed by Shulman including topics such as 1) knowledge and quality control, 2) students, 3) management and governance, 4) resources 5) follow-up and information utilization. Although there is a large body of research on the evaluation of teacher education programs there is a need for systematic information from different types of evaluations. Typically a program evaluation focuses on only one or more aspects of a program such as resource allocation, quality of faculty, access to field experiences, etc. Bean (1994) described an example of a systematic program evaluation used by the Office of Education for the State of Utah. A meta analysis of the purposes and methods of teacher education program evaluation, with particular reference to the formative and summative nature of those evaluations, would be useful information for those considering changes to teacher education.

Indicators in education: Principles and Practices

Although relatively new to education, indicators have a long history in social and economic policy systems in our society. Indicators such as the consumer price index and stock market indexes are well known to the public and are useful for the experts in those fields. Although there may be a generally accepted understanding of the broad purpose and nature of indicators, there is not a clear definition of the term. Typically, an indicator is understood as a source of information or measurement used to gauge or track factors that make up a social system. Indicators often are statistics used to monitor conditions that may not be apparent to most observers.

The purpose of indicators is "... to characterize a system through its components, how they are related and how they change over time." (Shavelson, McDonnell, & Oakes, 1991, p.1). Such information provides a form of accountability, particularly in social policy where leaders (such as elected officials) are expected to keep stakeholders informed and to be responsible for the effects and consequences of their (the officials) policies and practices.

In a seminal presentation on educational indicators more than twenty years ago, Jaeger (1978) noted numerous, oft incompatible, definitions of the term, observing, "One person's indicator is another person's statistic, and a third person's variable (p. 278)."

Time does not seem to have clarified the situation. Although educational indicators generally are information sources that can be systematically monitored across time, there are tremendous variations among indicators in their conceptual bases, interpretive framework, audience, purpose, and potential use. Indicators are not restricted to accountability concerns; when monitoring a system's components or its direct impacts, indicators provide information that can be used to improve the system. Such indicators (although not always termed thus) have long been part of program evaluation; it is the concept of accountability that characterizes renewed interest in educational indicators.

The difference between these two interpretations of "indicator" warrants further elaboration. From a program evaluation perspective (where the purpose of the evaluation is to improve the program), a useful indicator is one that provides specific information regarding specific aspects of the program that can be changed. For example, the previously cited CMEC (1996) report noted, "It is necessary to set out as specifically as possible the skills expected of a teacher. Once drawn up this list becomes a valuable tool ... for assessing the outcomes of training" (p. 27). To be useful, information regarding these skills—indicators—must evidence consequential validity: that is, when program changes are based on the indicators, improved teacher skills result.

In this context, effective indicators are those which directly measure system components; provide specific (preferably, criterion-referenced) information; and are based on sound theoretical or empirical networks which relate the system's inputs, components and outcomes. That is, to effect improvement, we must know what specific variables to change and how and what specific variables will be affected.

Many well-known accountability indicators are more general in nature. *The Economist's* tongue-in-cheek Big Mac Index (which "indicates" living standards around the world by reporting the

number of hours of work required to earn a Big Mac), monitoring housing starts as an indicator of a nation's economic health, and ranking education systems in various countries by per-student expenditures are representative of indicators which monitor proxies of a system's components or impacts rather than the components themselves.

When accountability indicators are used to rank or compare the relative performance systems, indicators need not meet the stringent criteria required for program improvement. Norm-referenced indicators, obviously, are acceptable. Proxy measures may work. We need not know the complex, causal relationships among the indicators and the system components.

Consequential validity shows a different face: what are consequences—to the programs and to society—of the rankings? Of course, indicators of this nature may be of little use when trying to improve a program. Will the national economy really improve if a program to artificially encourage housing starts is introduced? Will student achievement necessarily improve if per-student expenditures are increased? Will a university's program improve if it recruits more out-of-province students (an indicator in the *Maclean's* university ranking survey)?

Confusion among the various uses of the term indicator can affect recommendations regarding public policy and teacher training programs. For example in a study on the impact of out-of-field teaching, Mandville & Liu (1997) hypothesized "... that the degree of content area preparation of seventh grade mathematics teachers would differentially affect student performance as a function of the level of mathematics tasks used to assess that performance (p397)." Their conclusions and recommendations were consistent with popular wisdom:

"Since student learning of higher level thinking skills appears to depend in part on the subject matter knowledge of the teachers, future efforts to improve this situation might include: (1) providing opportunities for and encouraging teachers to increase their knowledge of mathematics; and (2) making maximum use of the available secondary-prepared mathematics teachers ... Requiring prospective intermediate grade mathematics teachers to have a college major or minor in mathematics, or preservice training with courses in mathematics comparable to those required for a major or minor in mathematics (p.406)."

Although Mandville & Liu's hypothesis with regard to teacher knowledge was very specific and their conclusions and recommendations equally so, their indicator of "the subject matter knowledge of the teacher" was not. "Since a direct measure of this variable was unavailable, it was necessary to use a proxy variable—type of certification ... (p. 399)." And they did not stop there. Although "subject matter knowledge of the teacher" seems to be a teacher variable, student achievement data was not linked to a specific seventh grade mathematics teacher. Instead, schools were classified as having high (or low) prepared mathematics teachers according to the certification of all the seventh grade mathematics teachers in the school; student performance, similarly, was pooled within schools.

Mandville & Liu's research and conclusions (and similar research) appear to have relevance for the design effective teacher training programs. Their use of macro, proxy indicators jeopardizes the validity of their findings regarding teacher training.

Polysemy—the use of one label for several referents or meanings—is a serious problem when discussing educational indicators. Different uses of “indicator” are based on different understandings of what an indicator is. The construct and consequential validity framework for an “indicator” shifts according to the meaning intended. Caution is warranted when using an indicator valid for one purpose to address a problem of a different type.

Indicators in teacher training: uses and potential pitfalls

An intriguing research question is investigating the impact of teacher competence on student achievement. Frequently, some educational researchers, politicians and interest groups call for an investigation of the impact of teacher training on eventual achievement of the teachers’ students (e.g., Bickis, 2001; CMEC, 2001; Ingersoll, 2001; Mandville & Liu, 1997). Bickis (2001), for example, presented the case that poor performance by students in freshman mathematics at the University of Saskatchewan was a consequence of the lack of formal mathematics preparation of many of the province’s high school mathematics teachers. He based his argument on the 50% failure rate in introductory university math and the high proportion of math classes taught by teachers working out-of-field. On the surface, these seem like reasonable questions and arguments with considerable intuitive appeal: if a recently-trained auto technician ably tuned your car, it would reflect well on the technician’s training; conversely, if the technician did not know how to do a tune-up, we would question the quality of the training program. Similar conclusions about training programs would arise if a recently-trained medical doctor was unable to complete a patient history or if a recently-trained teacher was unable to plan a lesson. Such reasoning may be plausible when cause-effect relationships are known and when the network of influences and outcomes is uncomplicated.

Conversely, it’s unlikely that a researcher or public policy analyst would measure the physical fitness levels (or wellness) of a sample of adults, then attempt to relate fitness levels to the medical training programs completed by their physicians. The complex set of variables which influence physical fitness—exercise, nutrition, motivation, interests, opportunity-to-exercise, genetic and environmental factors, etc., in addition to the treatment they receive from their physicians—would be recognized readily. Similarly, researchers and policy analysts would acknowledge that the physician’s performance was affected by many variables in addition to their medical school training (e.g., work situation; physician style, attitude and biases; work experiences; formal and informal professional development; etc.).

What is the situation when trying to demonstrate impact of teacher training programs on eventual student performance on indicator exams? Is the network connecting *student performance* (on indicator tests) and *teacher training programs* known, uncomplicated and direct; or is the network ill-understood, complicated and indirect? Although this paper is not intended to develop the theoretical network relating teacher training programs and student performance, an abbreviated summary of the network is presented in Figure 1. Note the many categories of variables—in addition to the teacher training program—which affect teacher learning. And the many categories of variables which affect the teacher’s classroom performance. And the many categories of variables which affect student learning. And the many categories of variables which affect student performance on an indicator test.

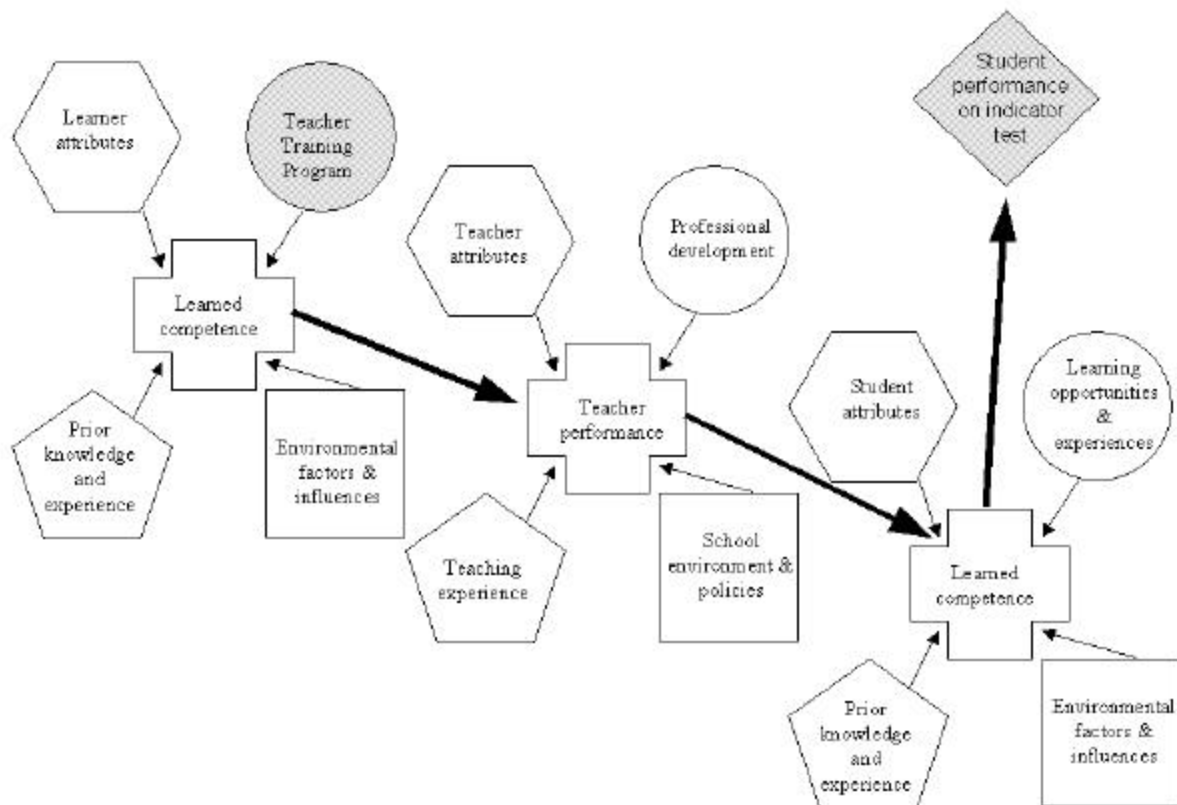


Figure 1: A simplified model of teacher training and student learning variables

To further complicate the situation, research on many of the links is incomplete. For example, Wenglinsky (2000) investigated the links between the characteristics of teacher education institutions, their programs, and performance of students in those programs on licensure tests. They found statistically significant, but weak relationships between the various teacher training institutions and licensure test scores. Indeed, the strongest influences on licensure test scores were student variables—prior test scores and socioeconomic status; the impact of characteristics of teacher training were comparatively small.

Use of remote proxy indicators—such as subsequent student performance on indicator tests of unknown curriculum validity—are not likely to provide insight concerning the quality of a teacher training program.

During the early development of this paper, the authors intended to explore the relationships among teacher training programs, teacher variables and subsequent student achievement on large-scale indicator tests such as SAIP and TIMMS. Following review of existing literature and examination of the teacher data available in some of these programs, the authors realized that the teacher training indicators tended to be of the general, proxy indicator type (e.g., highest level of formal education, possession of a teacher training certificate, years of pre-service training, area of major study). Missing from the databases were those indicators that directly measure system

components or provide specific program information. Accordingly, this examination was not conducted.

There are, of course, other more predictable problems to establishing education indicators. As with any measurement problems indicator systems must meet the traditional tests of validity and reliability. If one is attempting to identify and measure important constructs, then construct validity becomes a central concern. More importantly, if the indicators are to have a role in policy formation or program decisions, evidence of consequential validity is essential.

As well, an indicator program must be explicit as to how measurements are to be taken. Camilli and Firestone (1999) pointed out the problem of value judgements associated with developing and interpreting indicator information and the danger of interpreting indicators as having a causal or explanatory power that goes beyond the simple descriptive nature of an indicator.

Another potential limitation of an indicator system is the relationship or more accurately the confusion between indicators and standards. Identification of input, process and outcome indicators includes that tacit assumption that there are clear expectations with respect to the indicator. Indicators are not by definition standards, however it is quite possible that indicators could be translated into expectations and by extension into standards.

Some problems in developing education indicators are common to other social sciences. Murnane (1987) described similarities between economic indicators and education indicators, particularly with respect to common problems. There is the problem of how much the data are disaggregated, that is, to what unit of interest does the indicator apply. Murnane uses the example of student achievement that can be reported at many levels—classroom, school, jurisdiction, or province. Also education indicators pose a problem in that the governance structure of education is highly decentralized. That point is applicable to Canada where education generally and teacher education specifically, is a provincial responsibility.

In summary, the use of indicators is becoming an established element of the education system. There is much evidence on how indicators have been developed and used, typically to describe and provide information on student success or on the performance of the broader education enterprise. There is less information on the use of indicators to measure the effectiveness of teacher education programs.

Indicators of successful teacher training

Because there is a broad use of indicators in education, the purpose here is to provide only a brief overview in anticipation of proposing an indicator system for teacher education. Jaeger (1978) was one of the first to offer a systematic examination of educational indicators although he did not provide a specific operational definition of the concept. Jaeger provided a useful discussion on the technical considerations of educational indicators. He suggested three types of interpretative generalizations available through indicators; 1) statistical generalization, 2) substantive generalization, and 3) temporal generalization.

Later, Shavelson, *et al.*, (1991) suggested a more specific definition proposing that “An indicator is an individual or composite statistic that relates to a basic construct in education and is useful in a policy context” (p.2). An important contribution of this definition is the emphasis on the two components of an indicator—its conceptual basis and its usefulness in practice. Shavelson, *et al.*, also pointed out that though, by definition, indicators are statistics, not all educational statistics can be treated as educational indicators. Indicators must measure something that is both important and meaningful to observers who are trying to understand and interpret aspects of the system.

Recently, authors such as Ogawa and Collum (1998), Camilli and Firestone (1999) and others have reviewed the nature and purpose of indicators in education and how indicators should be developed. This latter point is particularly important, in part because there is little information on the preferred processes to identify useful indicators. Clearly the purpose of what is to be measured in a system is a critical decision when one attempts to interpret the information provided by an indicator. Ogawa and Collum identify five uses for indicators in education, that is, description, evaluation, monitoring, value judgements and policy relevance. Camilli and Firestone suggest there are four main uses for indicators; description, monitoring, diagnosing problems and accountability

Other writers and researchers (Porter, 1988; Oakes, 1989; Blank, 1993; Ogawa and Collum, 1998) have also addressed aspects of indicators such as the problem of clarifying the definition, the purpose, and the effects of educational indicators. Oakes, for example emphasized the importance of the context of an indicator system. They are “most useful when decision makers understand them as *enablers*, rather than causes of student learning” (p.195). Porter (1988) cautioned against the potential politicization of indicators, suggesting they may strengthen centralization of control of education (p. 503). Blank (1993) suggested that an important element in developing an indicator system was the process of establishing the indicators such as gaining consensus as to what should be measured.

What is it that one measures as an indicator of system performance? Although there is no single best way to identify indicators, there are some generally accepted principles that provide a framework. As Shavelson *et al* (1991) suggested, an indicator must be related to a basic construct in education, such as student characteristics, curriculum content or quality of teaching. For example, there are many factors that could be considered to have an effect on student learning. Indeed, Wang, Haertel and Walberg (1990) identified over thirty variables in their meta-analysis of what influences classroom learning. The extent to which any one or more of those factors could or should be an indicator would require considerable discussion and or research.

Others (Dickson and Linn, 1991; Blank, 1993; Sorensen, 1998) suggest that indicators can be developed and tested through research on inter-organization, cooperation and collaboration. Underlying such suggested processes is the assumption that divergent education stakeholders can agree on what is it that can and should be measured and used as an indicator. A further assumption about the process of establishing education indicators is that there are ‘experts’ who possess the knowledge base to clearly identify the constructs that make up an education system. Clearly these decisions may be value-based, a fact that may limit the interpretation and importance of one or more indicators in any system.

Deans' of teacher training institutions views of useful indicators

To determine the type of information—indicators—monitored by teacher training institutions during program reviews and revisions, a web survey was distributed to deans (or designates) of teacher training programs in Canada and Australia. The survey consisted of three parts: (1) information concerning the program and institution; (2) twenty-two items concerning the extent to which they use various information during program revision; and (3) rating of the value (as indicators for appraising teacher education programs) of thirty-four possible indicators (see complete survey in Appendix A). The information sources presented in Part 2 of the survey were based on those commonly reported in the literature and known by the researchers to be used at various teacher training institutions; these information sources were supplemented by performance standards and statements of teacher impact on pupil learning. The indicators rated in Part 3 of the survey were based on goals and objectives commonly found in teacher education programs, performance standards from *Preparing A Profession* (1998), and indicators often used in large-scale accountability reports.

E-mail requests to complete the survey were sent to all members of the *Canadian Association of Deans of Education* (N=50) and to all members of the *Australian Council of Deans of Education* (N=80). They completed the survey on line at their leisure.

Response rate was unfortunately low ($n_{\text{Canadian}} = 12$, $n_{\text{Australian}} = 8$), perhaps attributable to attempting to collect data during final exam period (Canada) and Easter break (Australia). Deans from both countries reported using the same top ten sources of information that during program reviews and revisions. Extensively-used sources of information included consultations with educators in the field, formal program reviews, theory and research in teacher education and employment opportunities for graduates. Deans from both countries similarly concurred regarding information that received little use: skills and competencies of current students and previous graduates (including comparisons to performance standards), consultation with business and industry, and performance of K-12 students on provincial, national and international assessments. Table 1 presents the information sources rank-ordered by the means of rated use.

Table 1
Information sources used when reviewing/revising teacher training programs (rank-ordered by mean rating)

Information source (indicator)	Rank	
	Canada	Australia
Consultations with school administrators	1	5
Formal reviews of current program	2.5	8.5
Published theory and research regarding teacher education	2.5	1
Consultations with representatives of the department of education	4	5
Consultations with teacher certification body	5	12
Teacher shortages or surpluses in particular teaching specializations	6.5	5
Consultations with teacher associations	6.5	8.5
Measures of student success in field experience portions of the current program	8	2
Employment opportunities for graduates of teacher education programs	9	5
Success-rate of students in current program	11	14.5
Surveys of employers of recent graduates	11	12
Proportion of students who complete current program in scheduled time	11	10
Skills and knowledge of newly admitted students	13	5
Availability and quality of teacher education programs at other institutions	14	18
Complementing other teacher education programs in your geographic region	15.5	21.5
Measures of skills and competencies of current students	15.5	12
Comparisons of skills and competencies of current students to performance standards	17	20
Differential success rates among particular groups of students (e.g., indigenous, males)	18	17
Measures of skills and competencies of previous graduates	19	14.5
Teacher performance standards from professional organizations, employers, etc. (e.g., NCME Standards for Teacher Competence in Educational Assessment of Students)	20	16
Consultations with representatives of business and industry	21	19
Achievement of K-12 students on provincial, state, national, or international exams	22	21.5
Number of Responses	12	8

When asked to rate the value of various indicators that might be used to appraise teacher training programs, there was again concurrence between Australian and Canadian deans. Both groups rated quality of the program's curricula and instruction as most important. Various student knowledge, skills and competencies were the next highest rated. Interestingly, general (proxy) indicators similar to those used by OECD, large-scale accountability reports and *Maclean's* received the lowest ratings. Table 2 presents the indicators rank-ordered by the means of rated value.

Table 2
Value of indicators for appraising teacher training programs (rank-ordered by mean rating)

Indicator	Rank	
	Canada	Australia
Quality of curricula used in program	1	2
Quality of instruction in the program	2	2
Student knowledge of teaching literacy	4	9
Student knowledge of student variability and exceptionality	4	9
Access to suitable field experience placements	4	5
Student knowledge of the principles of learning	6	2
Student classroom assessment skills	8	9
Student knowledge of independent learning	8	13
Extent of involvement of practising teachers during field experience components	8	4
Student classroom management skills	12	16.5
Student knowledge of teaching technology	12	16.5
Student skill in basic teaching approaches	12	9
Student knowledge of basic skills (language arts and math)	12	9
Length of field experience	12	21
Student knowledge of teaching numeracy	16	9
Student knowledge of human growth and development	16	16.5
Proportion of faculty with completed doctorates	16	29
Employment success of graduates	19	16.5
Quality of facilities	19	14
Research productivity of faculty	19	28
Extent of technical support for technology-enhanced learning	21	21.5
Extent of involvement of stakeholders in program design	23.5	19.5
Extensiveness of graduate offerings	23.5	27
Program admission requirements	23.5	24.5
Availability of specialized programs	23.5	24.5
Institutional commitment to equity	26	26
Use of technology-enhanced learning program components (computer access, use of on-line resources, ...)	27.5	19.5
Extent of library holdings	27.5	9
Faculty-student ratio	29	31.5
Proportion of applicants admitted to program	30.5	31.5
Length of program	30.5	23
Alumni support	32	31.5
Availability of scholarships	33	31.5
The per-student funding allocated to the program	34	34
Number of responses	12	8

Discussion

This paper has explored the possibility of establishing indicators for successful teacher education programs. A set of proposed indicators has been identified based on generally accepted knowledge base and on a survey of deans of education in Canada and Australia. The ranking of potential indicators shows a pattern, first with respect to the general congruence between the two countries and second with respect to the actual rankings of particular indicators. There is clearly an implication that the most important indicators are a combination of ‘inputs’ such as curriculum and instruction and ‘outcomes’ such as specific skills. In either case the indicators need to be program specific. Those indicators, many of which are commonly used in large scale accountability programs, were ranked very low. Student-faculty ratio, alumni support, library holdings scholarships, and funding are not seen to be good measures of a high quality program. Typically these would be considered input indicators but they provide little information about a program. If it is true that program specific indicators are the desirable measures that would cast doubt on the current use of large scale ‘proxy’ indicators. For example, the indicators used in large scale projects such as OECD’s are removed from a teacher education program as envisioned here.

Although there is a clear differentiation between the top rated and bottom rated indicators other questions need to be addressed to better determine what more precisely might be considered useful indicators. First the list of potential indicators is quite long and it is not clear if aggregating some of the indicators would change the rating. Murnane, (1987); Oakes (1989) and others warn of the problems of aggregation and context for interpreting indicators. On the other hand it could be argued that some of the indicators are too general and should be disaggregated. For example, the two most highly rated indicators, quality of curriculum and instruction may need to be operationalized to be meaningful. What is quality? The use of standards may be one way to overcome this problem of generalized indicators. For example, the proposal by the Australian Council of Deans of Education uses the language of performance standards rather than indicators. Consideration should be given to establishing standards for teacher education in Canada.

A second question raised in this paper is the relationship between the generally accepted knowledge base and the indicators. It was assumed that there was a consensus on the knowledge base that could provide a framework for an indicators system. Shulman’s (1987) framework may be a useful starting place and that developing indicators can have the reciprocal benefit of both clarifying the knowledge base and making clear the indicators of a successful teacher education program. The problem of identifying the indicators from a conceptual framework is not new. Schumacher and Cauley (1990) used Shulman’s ideas to identify the indicators for teacher education program quality. They examined four general indicators 1) a liberal education, 2) pedagogical knowledge, 3) development of pedagogical reasoning, and 4) other selected indicators. In their discussion of data-based indicators they emphasized the importance of the validity of the indicators. The question of the validity of indicators is important in this study. Construct validity—the relationship between the indicators and the conceptual framework—is critically important. Additionally, the consequential validity—a subset of construct validity specific to the impact of decisions—of the set of indicators cannot be assumed; it must be empirically established.

A third issue, one that this paper did not address, relates to the relationship between teachers' academic background and the achievement of their students. As discussed earlier, questions of this nature are rife with validity, logical, theoretical and methodological problems.

In conclusion, this paper provided answers or at least guidance for teacher education in the following ways:

1. The evidence reported here through a review of the research and a survey provides a starting point for establishing quality indicators of teacher education programs.
2. The most useful indicators for teacher education are those closest to the program. It is doubtful if general indicators will be of value.
3. New models are needed to explore the relationship among the many teacher variables affecting student learning (e.g., teacher preparation, teacher performance, professional development, the effects of out-of-field teaching, etc.). Using simple proxies such as completion of particular teacher training courses, level of certification, or student achievement on large-scale tests will not provide valid tests those effects. As well the research on indicators cautions against assuming such simple causal relationships.

References

Australian Council of Deans of Education (1998). *Preparing a Profession*. Report of the National Standards and Guidelines for Initial Teacher education Project. Canberra.

Ayers J. B. and Berney M. F. (1990). *Teacher Education Program Evaluation An Annotated Bibliography and Guide to Research*. Garland Publishing Inc. New York.

Bean, S.W. Utah State Office of Education. (1994). Procedures for the evaluation of teacher education programs (Clearinghouse No. SP035208). Salt Lake City, UT: Utah State Office of Education. (ERIC Document Reproduction Service No. ED 369 763).

Blank, R. K. (1993). Developing a system of education indicators: Selecting, implementing, and reporting indicators (Clearinghouse No. TM020545). Paper Presented at the Annual Meeting of the American Educational Research Association. Washington, DC: Council of Chief State School Officers. (ERIC Document Reproduction Service No. ED 362 536).

Camilli, G., & Firestone, W. A. (1999). Values and state ratings: An examination of the state-by-state education indicators in Quality Counts. *Educational Measurement: Issues and Practice*. 18(4), 17-25.

Christensen, D. (1996). The Professional Knowledge- Research Base for Teacher Education. In *Handbook of Research on Teacher Education (2nd edition)*. W. R. Houston, (Ed.). Simon Shuster Macmillan. New York.

Council of Ministers of Education Canada (2001). Request for Proposals. Unpublished manuscript.

Council of Ministers of Education Canada (1999). Agreement-in-Principle Labour Mobility Chapter of the Agreement on Internal Trade/Teaching Profession. <http://www.cmec.ca/else/agreement.en.stm>.

Council of Ministers of Education Canada (1996). Enhancing the role of teachers in a changing world. A report prepared for the forty-fifth session of the International Conference on Education. Geneva.

Dickson, G. S., & Lim, S. (1991). The development and use of indicators of performance in educational leadership (Clearinghouse No. EA025032). A Paper submitted to the International Congress for School Effectiveness and Improvement. Victoria, BC: British Columbia Ministry of Education. (ERIC Document Reproduction Service No. ED 367 044).

Gore, J. (2001). Beyond our differences: A reassembling of what matters in teacher education. *Journal of Teacher Education*. 52(2), 124-135.

Ingersoll, R. M. (2001). Rejoinder: Misunderstanding the problem of out-of-field teaching. *Educational Researcher*. 30(1), 21-22.

Jaeger, R.M. (1979). About educational indicators: Statistics on the conditions and trends in education. *Review of Educational Research*. 6. 276-315.

Mandville, G., & Liu, Q. (1997). Effective of teacher certification and task level on mathematics achievement. *Teaching and Teacher Education*. 13(4), 397-407.

Mayes, C. (1998). The Holmes reports: Perils and possibilities. *Teaching and Teacher Education*. 14(8), 775-792.

Murnane, R. J. (1987). Improving education indicators and economic indicators. The same problems? *Educational Evaluation and Policy Analysis*. 9(2), 101-116.

Oakes, J. (1989). What educational indicators? The case for assessing the school context. *Educational Evaluation and Policy Analysis*. 11(2), 181-199.

Ogawa, R., & Collom, E. (1998). Educational indicators: What are they? How can schools and school districts use them? (Clearinghouse No: EA029958). Riverside, CA: California Educational Research Cooperative. (ERIC Document Reproduction Service No. ED 432 811).

Porter, A. (1988). Indicators: Objective data or political tool? *Phi Delta Kappan*. 69(7), 503-508.

Reynolds, M. C. editor (1989). *Knowledge Base for the Beginning Teacher*. Published for the American Association of Colleges for Teacher Education. Permagon Press. Toronto.

Schumacher, S., & Cauley, K. (1990). Data-based teacher education evaluation: Toward an indicator system of program quality (Clearinghouse No. SP032845). Richmond, VA: Virginia Commonwealth University. (ERIC Document Reproduction Service No. ED 327 518).

Shavelson, R. J., McDonnell, L. M., & Oakes, J. (1991). What are educational indicators and indicator systems? (Report No. EDO-TM-91-4). Washington, DC: ERIC Clearinghouse on Tests, Measurement, and Evaluation. (ERIC Document Reproduction Service No. ED 338 701).

Shulman, L.S. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review*. 57(1), 1-22.

Sorenson, J. E. (1998). An investigative study on the systematic application of effectiveness indicators for institutional improvement in northwest community colleges (Clearinghouse No. JC990230). Oregon State University. (ERIC Document Reproduction Service No. ED 429 649).

Walberg, H., & Zhang, G. (1998). Analyzing the OECD indicators model. *Comparative Education*, 34(1), 55-70.

Wang, M., Haertel, G., & Walberg, H. (1990). What influences learning? A content analysis of review literature. *Journal of Educational Research*. 84(1) 30-43.

Wenglinsky, H. (2000). Teaching the teachers: Different settings, different results. Technical report. Princeton, N.J.: Educational Testing Service.

Appendix A: Dean's Web Survey

Quality Indicators of Teacher Education Programs

Part I: Institution and programme information

" What is your position?

Dean (or equivalent)

" Associate/Assistant Dean (or equivalent)

" Program director (or equivalent)

" Other

Where is your institution located?

" Australia

" Canada

Type of teacher education program (check all that apply)

" Direct entry (students admitted directly from high school)

" Combined program leading to 2 degrees (e.g., B.A./B.Ed, B.Mus/B.Ed., B.P.E./B.Ed.)

" Non-direct entry (students must complete one or more years in another faculty prior to admission to education program)

" After degree (undergraduate degree required for admission to education program)

Is your program offered by or formally affiliated with a degree-granting institution?

" Yes

" No

What education degrees are available through your institution? (check all that apply)

" B.Ed.

" M.Ed./M.A.

" Ph.D.

" Ed.D.

" None

Number of students per year

" Fewer than 50

" 50 - 99

" 100 - 249

" 250 - 499

" 500 or more

Number of full-time faculty

- " Fewer than 20
- " 20 - 49
- " 50 - 74
- " 75 - 99
- " 100 or more

Are some of your courses taught by practising teachers?

- " Yes
- " No

What proportion of your classes are taught by sessional lecturers?

- " Fewer than 10%
- " 10% to 19%
- " 20% to 29%
- " 30% to 39%
- " 40% or more

Which undergraduate teacher education programs are offered by your institution? (check all that apply)

- " Pre-school teacher education
- " Elementary teacher education
- " Middle years teacher education
- " Secondary (high school) teacher education program
- " Adult teacher education program

Which of the following special programs are offered by your institution? (check all that apply)

- " Aboriginal teacher education program
- " Business/technical/vocational teacher education program
- " Education program combined with other discipline (e.g., music, kinesiology, etc.)
- " Language immersion program
- " Other

Your answers to some of the following questions may vary among the programs available at your institution. Please describe the programs in which the majority of your students are registered.

Normal length of teacher education program

- " 1 year
- " 2 year
- " 3 year
- " 4 year
- " 5 year

How long is the total field experience component? (e.g., student teaching, practicum, internship)

- " Fewer than 5 weeks
- " 5-9 weeks
- " 10 - 14 weeks
- " 15 - 19 weeks
- " 20 or more

Who supervises students during the field experiences?

- " Mainly faculty
- " Mainly professional teachers/teacher associates
- " Mainly school division personnel
- " Both faculty and professional teachers

Do students who successfully complete your program automatically meet teacher certification requirements?

- " Yes
- " No

Does your institution regularly prepare an “indicators report” regarding the teacher education program?

- " Yes
- " No

Please comment regarding any special features of your institution or programme.

Part II: Program review information

When reviewing and revising programs, to what extent do you use each of the following sources of information? Please use the following scale:							
1 = not at all	3 = sometimes	5 = extensively	1	2	3	4	5
Measures of skills and competencies of previous graduates			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Measures of skills and competencies of current students			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Comparisons of skills and competencies of current students to performance standards			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Achievement of K-12 students on provincial, state, national, or international exams			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Surveys of employers of recent graduates			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Consultations with teacher associations			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Consultations with school administrators			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Consultations with representatives of business and industry			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Consultations with representatives of the department of education			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Consultations with teacher certification body			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Employment opportunities for graduates of teacher education programs			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teacher shortages or surpluses in particular teaching specializations			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teacher performance standards from professional organizations, employers, etc. (e.g., <i>NCME Standards for Teacher Competence in Educational Assessment of Students</i>)			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Success-rate of students in current program			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Skills and knowledge of newly admitted students			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Proportion of students who complete current program in scheduled time			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Published theory and research regarding teacher education			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Complementing other teacher education programs in your geographic region			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Measures of student success in field experience portions of the current program			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Formal reviews of current program			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Availability and quality of teacher education programs at other institutions			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Differential success rates among particular groups of students (e.g., indigenous, males)			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Please comment regarding other information sources used during program reviews and revisions.							

Part III: Indicators of program success

The following statements describe possible indicators for appraising teacher education programs. Consider the value of each indicator as a measure of the quality of a teacher education program.

Please rate the indicators on the following scale: 1 = poor 2 = poor 3 = adequate 4 = good 5 = excellent					
	1	2	3	4	5
The per-student funding allocated to the program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Faculty-student ratio	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Proportion of faculty with completed doctorates	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Research productivity of faculty	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Extensiveness of graduate offerings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Institutional commitment to equity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Extent of involvement of stakeholders in program design	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Alumni support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Availability of specialized programs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Extent of library holdings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Availability of scholarships	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality of facilities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Proportion of applicants admitted to program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Program admission requirements	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Length of program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality of instruction in the program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality of curricula used in program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use of technology-enhanced learning program components (computer access, use of on-line resources, ...)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Extent of technical support for technology-enhanced learning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Access to suitable field experience placements	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Extent of involvement of practising teachers during field experience components	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Length of field experience	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Employment success of graduates	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Student knowledge of human growth and development	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please rate the indicators on the following scale:

1 = poor 2 = poor 3 = adequate 4 = good 5 = excellent

1 2 3 4 5

Student knowledge of the principles of learning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Student knowledge of basic skills (language arts and math)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Student knowledge of independent learning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Student skill in basic teaching approaches	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Student knowledge of student variability and exceptionality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Student knowledge of teaching literacy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Student knowledge of teaching numeracy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Student knowledge of teaching technology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Student classroom management skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Student classroom assessment skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please comment regarding other indicators that you think would be useful when assessing teacher education programmes.