



Summary of CaseNEX Research

“There is no need to invent artificial challenges for teachers. Real life in schools presents the best opportunities from which to learn.” --John Dewey

CaseNEX (originally “CaseNET”) was founded at the University of Virginia over 15 years ago and provides an online, case-based approach to professional development and teacher training. The more than seventy cases in the CaseNEX library concern educational life in elementary, middle, and high schools across the United States, as well as in Australia, Cuba, India, South Africa, the Netherlands, and France. Students participate virtually in weekly class sessions, and an online instructor, who has completed a training session sponsored by CaseNEX, guides student work.

Working from scenarios or “slices of real classroom life”, preservice and inservice CaseNEX participants learn to apply a case-study method. The method consists of five steps for making judgments in teaching and learning situations:



- (1) Identifying issues, problems, dilemmas, and opportunities;
- (2) Recognizing multiple perspectives;
- (3) Calling up available knowledge;
- (4) Proposing actions, and
- (5) Forecasting consequences of such actions (McNergney, Herbert, & Ford, 1994; McNergney & Medley, 1984).

These processes help summon participants' intellectual responsibility, encouraging them to be cognizant of the issues and knowledge that guide their thinking and actions rather than uncritically accepting others' ideas. In exploring other perspectives and considering the possible consequences of proposed actions, participants will also increase their understanding of the complex moral decision making and the complicated realities inherent in teaching. In doing so, they will become better equipped to face similar issues in their professional lives.

Research in Teacher Evaluation and Assessment

No single approach to teaching or learning will work equally well with all people for all objectives. This maxim applies to learners of any age in virtually any field of study. Individuals are said to “interact” with educational environments in different ways yielding learning that varies across people in both quantity and quality. With the publication of Aptitudes and Instructional Methods in 1977, Stanford researchers Cronbach and Snow ignited a search for statistical evidence of interactions between learners and educational approaches. The basic idea was to reject the shopworn, inaccurate view that effective teaching was some kind of “magic” that could be conjured up to defeat educational failure of any shape or size. Instead, people in disparate fields of study—medicine, management, economics, counseling, psychology, and so forth—began to seek information on how to “adapt” or “differentiate” treatments to enhance people's chances for success.

In 1981, McNergney in Virginia and Carrier at the University of Minnesota translated ideas on interaction into a book entitled Teacher Development. Their concept of “teacher development” was one that matched professional education to teachers' needs and abilities and to the multiplicity of tasks, personal and professional, that teachers face on the job. They argued that teachers, just as other learners, could not reasonably be expected to learn in homogenized programs—studying the same content, in the same way, at the same points in their lives—and be prepared to help learners succeed.

Teacher development had to be “fitted” to the many different people who called themselves “teacher” and to the challenges they would encounter in their work. This realization stimulated the creation of teacher education curricula marked by several critical attributes: individualized, concerned for the developmental needs of learners, attentive to contemporaneous events in learners' lives, amenable to high interactivity, and above all focused on providing practical value. This no-one-best-way-to-educate-all-teachers view of educational leadership reflected an early and abiding concern for the dignity of the individual and for her or his knowledge of practice. This constant guided our work in the early days, while some basic tenets of teaching and learning provided conditions for the germination of a view that would eventually grow into the CaseNEX approach.

Process-Product Research

Process-product research in education emerged in post-WWII America from empirical efforts to identify links between teaching (process) and student learning (product). It was a reaction to years of fruitless investigation, which consisted largely of trying to identify “good” teachers by correlating teacher characteristics with supervisors' ratings of teachers and with students' test

scores. In contrast, process-product researchers brought principles of science and behavioral engineering to bear on classroom interactions. They described teachers' behaviors in classrooms through direct observations and students' products as measures of short- and long-term learning, connecting the two through both correlational and experimental methods. Their intent—unlike the intent of individual differences researchers—was to identify general-effects models of practice that might be expected to work with all learners, regardless of the variability among them.

In 1988, McNergney edited a book (Guide to Classroom Teaching) based on this research, which served as the foundation for the Virginia teacher certification system—a system of classroom observation developed by a team of researchers at the University of Virginia. The book was purchased by the State and given to all beginning teachers for six years. As a compendium of research results written for an audience of practitioners, the book guided teachers to behave in ways that were likely to yield student learning.

While not rigidly prescriptive, the connection between teaching processes and student products is made explicit in CaseNEX methods today. Instructors in case sessions draw attention to both in steps four (Formulating Actions) and five (Predicting Consequences) of the analysis process. CaseNEX sessions are not conversations where anything is acceptable, but purposeful exchanges meant to move participants toward the formulation of teaching actions and the assessment of consequences, or the results of such actions. What teaching action might you take in a particular situation, and how might you know if it is likely to work? Those using CaseNEX methods would want to answer this question in part by considering what research suggests about effective teaching and by using various types of data on student learning as estimates of mastery. Our view of professional practice is one where a teacher considers his or her effects on learners, both early and often, using such information to improve practice.

Linking Research and Practice

CaseNEX enjoys a certain advantage by its association with the University of Virginia and with the research community at large. The founders continue to serve as faculty at the University of Virginia actively engaged in research that stretches across the University and beyond. For instance, they are part of the effort to unite faculty in arts and sciences with faculty in education and in the public schools to explore the value added to K-12 education via the preparation of teachers. This work is funded by the Carnegie Corporation and Ford and Annenberg Foundations. They are also directing research funded by the Spencer Foundation to explore the decisions administrators make in hiring teachers.

A recent study by Imig (2003) involved the construction and evaluation of a multimedia web-based instrument based on the CaseNEX conceptions of case-based, web-based teaching and learning that purported to measure teacher's abilities to make complex interactive teaching decisions. This study was based in the competing notions that that every American student is entitled to an effective classroom teacher; however, there is little agreement as to what skills or knowledge effective teachers should possess or the type of assessment that should be used to appraise teacher's abilities.

The Interactive Teaching Assessment (ITA) blended videos of 5th and 8th grade math classes with 34 questions and 136 dichotomous items (4 items per question). Participants were given eight seconds to read each question, three seconds to read each dichotomous item, and three seconds to respond to each item. The questions were built on Lee Shulman’s (1987) categories of knowledge-and McNergney and Herbert’s (1995) five-steps of professional practice – identifying issues, empathizing with multiple perspectives, using knowledge, proposing actions and hypothesizing consequences. These are the central pedagogical foci in CaseNEX methodology. The chart below shows the distribution of ITA items.

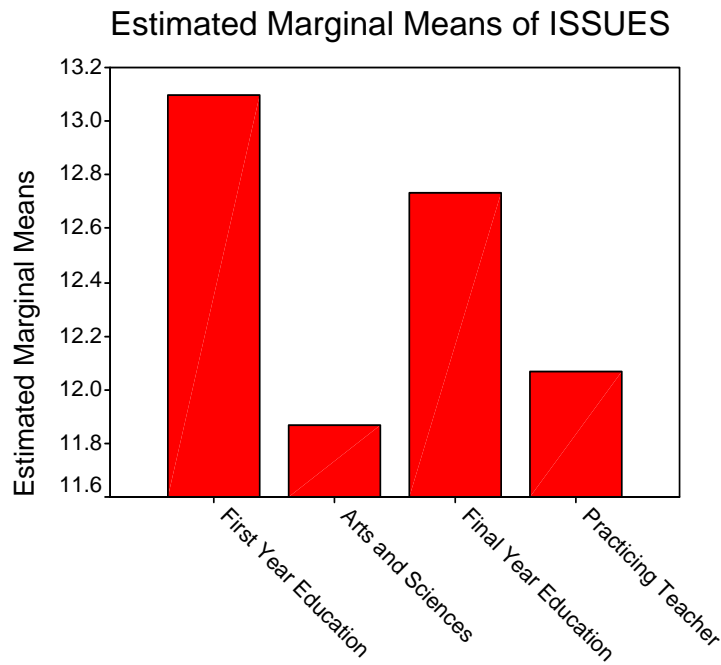
Table of Specifications for the Interactive Teaching Assessment

	Issue	Perspective	Knowledge	Action	Consequence	Total
Content Knowledge	4		24			28
Pedagogical Knowledge	12	16	12	24	12	76
Pedagogical Content Knowledge			4	20	8	32
Total	16	16	40	44	20	136

The performances of four groups of participants (practicing teachers, final-year education students, first-year education students, and arts and science students) on the ITA were compared. Participant attitudes toward the video and timing elements were also investigated. Results indicated that there were significant differences between the performance of those with and without educational training. Teacher education students significantly outperformed their arts and science counterparts on two steps of professional practice and the pedagogical knowledge questions. Practicing teachers, however, did not perform as well as the other groups on the ITA. This finding raises multiple questions about the appropriateness of interactive assessments for practicing teachers. The three statistically significant findings are presented below:

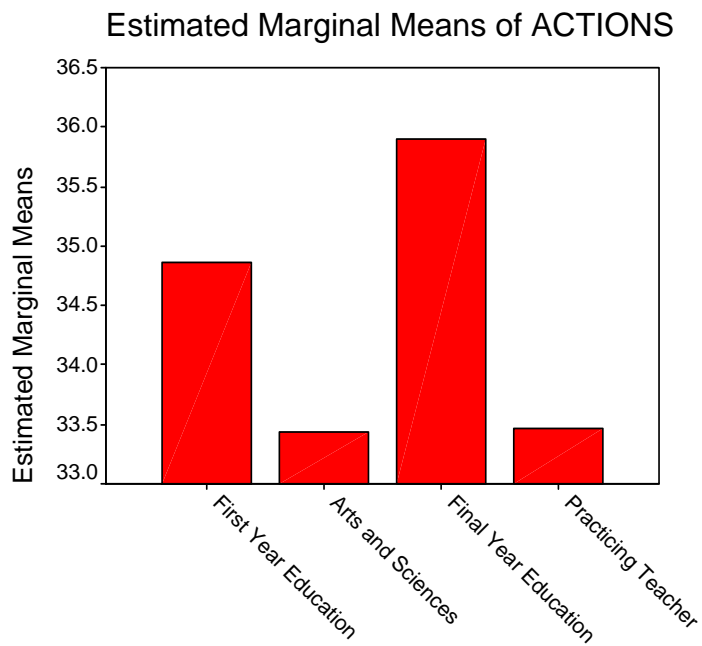
Issue-Step. There was a significant difference ($p=.011$) between the first-year Curry School of Education students and the arts and science students’ performances on the issues step of the 5-step professional practice model, as you will see in the figure below. Though not significant, final-year education students also strongly outperformed arts and science students on the issue items.

Mean Group Performance on the Issue Component of the ITA



Action-Step. There was also a significant difference ($p=.031$) between final-year Curry School of Education students and arts and science students on the action step of the professional practice model. This difference is presented below.

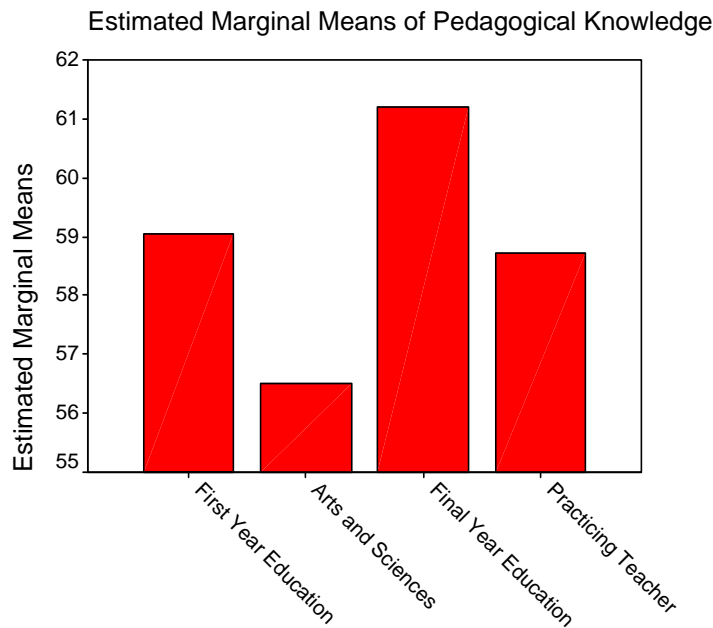
Mean Group Performance on the Action Component of the ITA



Pedagogical Knowledge. Shulman’s three types of knowledge are built on the premise teachers need to be masters of content, of teaching pedagogy, and of a blend of the two called

pedagogical content knowledge. Pedagogical knowledge is typically thought to be comprised of the general concepts, theories, and research about effective teaching, regardless of the particular content being presented. A significant difference ($p=.004$) emerged on the pedagogical knowledge component of the ITA between final-year Curry School of Education students and arts and science students. Though not statistically significant, it is noteworthy that first-year education students and practicing teachers strongly outperformed arts and science majors on the pedagogical knowledge items. These differences are depicted below.

Mean Group Performances on the Pedagogical Knowledge Component of the ITA



Participants overwhelmingly agreed (99.2%) that the video and timing elements added to the authenticity of the Interactive Teaching Assessment. These findings suggest a teaching assessment can be developed that appears to come closer than previous assessments to simulating the complex environment in which teachers work. The results of this general line of work will inform CaseNEX efforts to offer district-level evaluation and staff development. We expect also that these methods of investigating teacher decision making will ultimately influence recruiting and hiring practices as well as the design of teacher preparation programs.

Research Supporting Participation in CaseNEX Courses:

In a number of studies conducted at the University of Virginia, researchers have demonstrated that CaseNEX delivers instruction as it claims and that the approach accomplishes what it purports to accomplish; that is, people who participate in CaseNEX are better able than non-participants to:

- 1) Recognize educational issues, problems, and opportunities;
- 2) Take into account others' values when designing educational interventions;
- 3) Call up relevant professional knowledge when it is needed;

- 4) Forecast actions aimed at addressing particular problems; and
- 5) Assess the results of their actions.

In addition, studies have demonstrated that teachers who participate in CaseNEX are better at identifying problems, designing educational interventions to address them, and evaluating the effects of their teaching (Bronack, 1998; Imig, in press; Kilbane, 2000). A recent study of online and face-to-face offerings of CaseNEX courses also suggests that live and virtual treatments were equally as effective for promoting the moral development of teachers who entered the treatment with relatively low moral reasoning skills (Gartland, in press). Continuing examination of the CaseNEX curricula and research on teacher development will determine how participants extract meaning from their experience.

The content validity of our cases has been verified by several panels of outside experts, including representatives from the National Association of Elementary School Principals, the American Association of Colleges for Teacher Education, and the National Board for Professional Teaching Standards. They have been asked to judge (1) whether our cases are fair and accurate representations of the kinds of situations that administrators and teachers can be expected to face on the job, and (2) whether the problem in the cases are the kinds of problems they believe administrators and teachers should be able to address effectively. The experts exhibited an exceptionally high degree of agreement on both points.

The predictive validity of CaseNEX performance has been demonstrated through participants' judgments of their own competence and through observation of their performance by others. People who participate in CaseNEX perceive increases in their professional competence as a result of their participation. Others judge professional decision-making to improve with CaseNEX participation.

CaseNEX participation in both live, face-to-face situations and in online environments cause structural changes in participants' moral reasoning capabilities. Participants become more complex in their views of teaching and learning as a result of the training that CaseNEX provides. Complexity relates positively to a professionals' repertoire of educational intervention strategies and tactics—the more complex one's view, the more likely the professional will be to possess the capabilities to address a range of challenging situations.

Research Supporting the Case Method

The use of case studies for training purposes has long been a staple in the professions, but case methods have only rarely been put to use in the evaluation of teachers and teacher education programs. Case-based teaching in this country began at Harvard Law School in 1870 and now has a well-documented history in law, medicine, and business (McAnich, 1993). Case methods are typically used in the professions in which complex interactions require professionals to exercise judgment rather than to apply rules and principles in prescriptive ways. Case methods are also used to contextualize knowledge that students typically receive in a linear, fragmented way through separate courses during their teacher preparation (Shulman, 1986).

Case methods have only recently begun to take root in teacher education. Merseth divides the purpose and use of cases into three categories: cases as exemplars, cases as opportunities to practice analysis and contemplate action, and cases as stimulants to personal reflection (1996). Richly detailed, narrative accounts of teaching and learning episodes, case studies demand multiple levels of interactions between the material and the students (Merseth, 1991a). L. Shulman (1992) contends that the power of some cases rests in the content of the case and not in whether it is lectured about, discussed, or simply read. He suggests that cases can be used to teach teachers about theory, precedents of practice, strategies, as well as morals and ethics, ultimately making them better problem solvers. Others argue that the key to the case method is in the discussion process itself (Christensen with Hansen, 1987; Merseth, 1991).

Although it is impossible to address completely the complexity in teachers' jobs, case methods may provide realistic environments through which various problem-solving tactics can be applied and investigated (McNergney, Herbert, & Ford, 1994). This quality, educators have argued, makes case methods useful for promoting critical reflection (Greenwood & Parkay, 1989; Shulman, 1992a). A reflective problem-solving process developed by McNergney and Herbert provides a conceptual framework for developing the habits of professional thinking through case analysis (McNergney & Herbert, 1995). The strategy is based on assumption that students who can perform a set of actions in case studies have potential to do so when faced with similar situations in their future classrooms (McNergney, 1994; Bronack & McNergney, 1999).

The steps in this strategy are neither conceptually discreet nor rigidly sequential. Students' analyses must demonstrate that they have tried to: (1) identify educational issues, problems, or opportunities; (2) recognize different perspectives or values that drive people's actions; (3) call up personal, theoretical, and empirical knowledge relevant to issues identified; (4) propose possible actions for handling the issues identified; and (5) forecast the likely consequences of such actions (McNergney & Herbert, 1995).

Research Details on CaseNEX Participation and Case Method

Kent (1997) collected descriptive data over a two-year period on the use of the first Web-based multimedia teaching case ever documented. This case, entitled Project Cape Town, combines text, graphics, audio, and video to describe four "events" taken from four South African schools experimenting with racial integration. His work revealed several clearly identifiable navigational patterns. Asking participants to "do what comes naturally" when navigating Project Cape Town, he characterized three user styles--impulsive, response-focused, and balanced--based on the degree of structure exhibited by participants moving through a case. He also found that the media increased the realism of the case and that most participants considered the non-verbal information valuable in helping shape their analyses.

Bronack (1998) investigated the effects of case-based, web-based CaseNET environment on teachers' abilities to make decisions about educational problems presented in multimedia cases. He also examined the effect of course participation and non-participation on teachers' concerns about innovations such as Web-based instruction using the Stages of Concern Questionnaire. The difference between the CaseNET and non-CaseNET participants with regard to concerns about the innovation of web-based instruction was significant for all factors identified. The results of

this study suggest that teachers engaged in professional development via innovative environments such as CaseNET progress through developmental stages of concern and problem solving in predictable ways. Furthermore, data collect on teachers' level of satisfaction with the online experience was highly favorable. Over 90 percent of participants agreed or strongly agreed that the program helped them "bridge the gap between theory and practice". Approximately the same percentage agreed or strongly agreed that CaseNET helped prepare them to face classroom situations similar to those described in the cases. Though the results suggested that participation in CaseNET positively influenced participants' concern about innovations, Bronack indicated that the CaseNET treatment had no observable affect on CaseNET participants' ability to analyze multimedia cases.

Kilbane's (2000) work investigated the efficacy of a case-based problem solving method and examined the effects of learner control on participants' experiences with a multimedia case. The sample consisted of 33 preservice teachers participating in CaseNET at two institutions of higher education, 26 preservice teachers at these institutions not participating in CaseNET, and 34 arts and sciences students from these institutions who were neither participants nor preservice teachers. Results suggest that preservice teachers in CaseNET were able to learn the problem-solving strategy and apply it to analyzing a multimedia case study. CaseNET subjects were better at identifying issues and applying knowledge from various sources than were participants in the other groups. Results also suggest that all participants used professional knowledge from the case resources (lesson plans, student progress reports, etc.) to identify problems and propose actions but were limited to using knowledge from case resources they knew how to locate and interpret.

A study conducted by Gartland (2003) included 33 participants at two different institutions of higher education. All participants were either preservice or inservice teachers who enrolled in CaseNEX courses for graduate credit. To make comparisons, the groups were split in half with teachers opting to participate in either "live" or virtual" delivery of the CaseNEX course. The Defining Issues Test (DIT), a multiple-choice test based on Kohlberg's stage theory, was used to measure the moral judgment development of teachers in the sample. Results suggest that teachers were able to advance their moral reasoning skills during the CaseNEX intervention. Participants' gains were marked by increasing presence for more complex moral schema. Results also suggest that a collaborative, case-based approach can enhance the moral reasoning of teachers in both face-to-face and online contexts; that is, that one context is not superior to the other.

Kessler (2005) sought to answer the question: Do teachers' decision making, and in-class behaviors contribute to pupils' gains in academic achievement? Her study extended and refined research in the areas of presage-process-product research, teacher decision-making, and the utility of case study pedagogy in programs of teacher preparation. Most important, this research enabled an experimental examination of the relationships among and between teachers' thinking, their behaviors exhibited in class, and their pupils' gains in achievement. The study grew from the Byrd-Nottingham study, a pretest-posttest comparison, group design with random assignment of pupils. The Byrd-Nottingham study yielded observational data of both teacher candidates and arts and sciences majors as they instructed sixth- and seventh-grade students in the content of data representation and analysis. Pretest-posttest scores were used to calculate value added by instructors.

In this study, 31 of the original 36 teachers from the Byrd-Nottingham study analyzed a multimedia case dealing with middle school mathematics to obtain measures of teachers' decision-making abilities defined in terms of McNergney and Herbert's (1995) five-steps of case analysis: 1) identifying issues and problems; 2) examining said problems and issues from a variety of perspectives; 3) pulling from empirical, theoretical, and personal knowledge; 4) proposing actions to ameliorate the problems and issues at hand; and 5) hypothesizing the likely consequences of those actions they propose. Teachers' analyses were assessed by two experts in case methodology. Working from teachers' decision-making scores, the observational data of these teachers in action, and their pupils' gains in achievement, tests of multiple regression were conducted to examine the relationships among and between these three variables.

Results indicated that teachers' decision-making abilities influenced two clusters of in-class behaviors, those concerning a) creating a Coherent Curriculum and b) providing students the opportunities for Application and Practice. The decision-making components that were most significantly linked to their Coherent Curriculum in-class practices were teachers' abilities to examine issues and problems from a variety of perspectives. This result suggests that programs of teacher development would be well advised to provide their participants with opportunities to consider the myriad audiences they serve. By doing so, teachers are more apt to exhibit instructional practices that are coherent and goal oriented.

The decision-making subcategories (steps 1-5) that contributed most to participants' behaviors of Application and Practice were their abilities to propose actions for issues and problems and to forecast both the intended and unintended consequences of those actions. Again, the implication that arose from this finding is that in order to assist teachers in providing appropriate application and practice opportunities in the classroom, programs of teacher development would be well-advised to present their participants with ample time to consider alternative actions and speculate on the likely outcomes of those actions.

Although aggregate regression findings failed to link teachers' decision-making abilities to pupil achievement, a disaggregated regression equation yielded data suggesting that teachers' abilities to identify issues is a greater predictor of pupil achievement than are their abilities to propose actions. This finding suggests that novice teachers' propensity to act – to leap before looking – might be detrimental to pupil achievement. Accordingly, it is essential that teacher development programs assist their participants to resist “hair-trigger” reactions in favor of thoughtful actions.