DOWNLOAD PDF EXPANDING CURRICULUM RESEARCH AND UNDERSTANDING

Chapter 1 : Understanding the Expanded Core Curriculum | Perkins School for the Blind

Expanding Curriculum Research and Understanding discusses the use of multiple research approaches (paradigms) to inquire into all aspects of curriculum (the knowledge base of schooling), with the goal of understanding the processes and the substantive dimensions of curriculum. The Mytho-Poetic approach, which is an overarching research approach.

As is seen, it is also possible to depict all one-step multiplication and division problems using the same format. Vergnaud identified two different types of relationships in the entries of this diagram: In both situations the relationships are multiplicative in nature: Using the scalar within measure space relationship from this table, a-c implies a multiplication by or a is mapped onto c by the multiplicative operator In proportional situations, b-x implies the same multiplicative relationship and we have: Therefore c-x implies the same relationship and we have: Because the quantities are proportional, the same relationship exists between b and x. Similarly, in Equation 2 , the functional relationship between a and b is defined as b over a. By stressing early the multiplicative relationships between any two numbers, children can be taught to extend their understandings and apply them directly to a rich class of problem situations in a more meaningful manner than is currently being done. These implicit models are very resistant to change and cause difficulties later on. It is likely that the general phenomenon of stressing interrelations within and between mathematical domains will replicate itself many times over as new insights are gained into both the mathematical as well as the pedagogical aspects of the topics embedded in school mathematics curricula. Underlying each of these advances has been the use of research paradigms different from those in vogue 20 or more years ago. There has been much research with individuals or with small groups of students, utilizing extensive observation and participation, regular in-depth student interviews, and protocol analyses. The teaching experiment, and other ethnographically oriented paradigms, have been the paradigms of choice for many mathematics educators during the past 15 years. Protocols resulting from student interviews, many of which have resulted from teaching experiments, have provided rather detailed insights into the ways in which students come to know a mathematical concept. Such information was largely unavailable in the s and s, given the experimental paradigms then in use. More sophisticated information is now available. Our own work has utilized the teaching experiment on four different occasions since Instructional periods consisted of 12 , 18 , 30 , and 17 weeks respectively. The first three dealt with a variety of rational number subconcepts part-whole, decimal, ratio, and measure -the last related to the role of rational number concepts in the evolution of proportional reasoning skills at the seventh-grade level. In general, project personnel would assume responsibility for all rational number-related instruction 4 days per week. Respectively, 6, 9, 30, and 9 students participated in the experiments. All students were interviewed regularly in the smaller classes and a selected group of eight or nine students were interviewed in the third experiment, which utilized a whole-class situation for instructional purposes. The studies were conducted simultaneously in Minnesota and in Illinois in as close to an identical manner as possible. RNP interviews generally contained a variety of topical considerations or data strands. Selected items were repeated during several interviews, providing the opportunity to trace the evolution of student thinking about those particular items. These data then were transcribed, cumulated, and analyzed, and appropriate conclusions were drawn. The curriculum implications of these investigations are discussed. First we should note that the difficulty children have with rational numbers should not be surprising, considering the complexity of ideas within this number domain and the type of instruction offered by the textbooks. Instruction offered by the textbooks does not compensate for this lack of informal experience. The textbook-based instructional emphases develop procedural skill for fraction and decimal operations and teach prematurely the cross-product algorithm for solving missing value problems. Operations taught are not based on natural activity. This divorce of operations from their meanings makes a difficult content area even more troublesome for students to assimilate, despite the fact that children do have some informal knowledge about fractions. In many cases such informal knowledge is incorrect or misleading "When the number on the bottom is bigger, the fraction is smaller. Let us examine examples showing the complexity of some fraction ideas. English children reported that a fraction was not a single number; children said it was two numbers or not a number at all. In fact, one in eight secondary teachers did not think of a fraction as a number Kerslake, Often children would treat the given portion of the number line as the whole. Actually, such misunderstandings are not limited to children. If two fractions are ordered by the size of piece, then the inverse relationship between number of pieces and size of each piece suggests that one half is greater than one third. Whole number ideas often persist in the decimal domain as well. Hiebert and Wearne reported that children have difficulty ordering decimals consisting of different numbers of decimal places. For example, a common error in ordering. Here children are making their decision based on the whole numbers 39 and 4. The RNP found that some intermediate-level teachers also made this error Post et al. Some errors in addition and subtraction also reflect this persistence of well-developed whole number procedures. In general, the RNP found that when children faced difficulty with a fraction or proportion task they looked to whole number schemas to help them find the answer. She explained her process as finding a factor that changed 4 to 8 and then using that same factor 2 to change 3 to 6. A coherent and correct response! She explained that she needed to add 1 to the numerator. When asked to explain why she multiplied in the first problem and added on the second one, she responded "that you first look for a whole number to multiply by and if you cannot find one then you look for a number to add. Karplus, Pulos, and Stage referred to similar occurrences in eighth-grade students as a fraction avoidance syndrome. Concepts in Secondary School Mathematics and Science CSMS studies reported that children have difficulty coordinating the whole number idea that multiplication makes bigger with the procedure used to generate equivalent fractions. Instruction that does not take time to develop a deeper understanding results in children relying on rote memory and techniques that are "half-remembered and inappropriately applied" Kerslake, Fraction order and equivalence ideas are fundamentally important concepts. They form the framework for understanding fractions and decimals as quantities that can be operated on in meaningful ways. Before adding, subtracting, multiplying, or dividing decimals, students should be able to estimate a reasonable answer. Order and equivalence ideas and the contexts within which these problems are embedded will help children judge the reasonableness of their answers. Ordering procedures using least common denominators as developed in textbooks are useless in the estimation process. Intuitive, experiential based strategies will be more helpful. Extensive use of various manipulatives provided the framework within which students were able to generate the fraction-ordering strategies Behr et al. Because children routinely would describe existing and newly emerging relationships in terms of their own past experiences with a variety of manipulative aids, it appears that their thinking is based on internal images constructed for the fraction through extensive use of manipulative aids. So it would be less" Roberts, , p. The role of mental referents for numbers is critical for students to initially operate on them meaningfully. The part-whole model for fractions and decimals is the dominant instructional model used by textbooks. The RNP teaching experiment did present different interpretations for rational numbers as suggested by Kieren Interviews over the week experiment showed fourth-graders relied on the part-whole model and used this interpretation to make sense of the fraction symbols. This teaching experiment made heavy use of manipulative materials and adopted the position that it was the translations within and between modes of representation that made ideas meaningful for children. Consequently, students spent a good deal of time interpreting rational number ideas within and between fraction circles, Cuisenaire rods, chips, paper folding, and number lines. Also involved were the verbal, pictorial, symbolic, and real-world modes of representation. These translations are discussed in more detail in later sections of this chapter. These three characteristics of thought are hypothesized to be important for successful performance on tasks dealing with order and equivalence of fractions. Some observations from the data do suggest hypotheses about hierarchical relations. This student appeared to acquire the following abilities in approximately the order given: The ability to make single bidirectional translations between symbols and manipulative materials. The ability to make transformations on embodiments and to make their related transformations on fraction symbols. The ability to coordinate bidirectional translations; that is, to translate a judgment about embodiments to a judgment about the represented fractions, 4. The ability to preplan a manipulative display, which represents the emergence of embodiment-independent thought. Emerging ability to identify sequences of symbols that correspond to sequences of physical manipulation and fraction embodiments. The ability to apply consistently and correctly transformation algorithms for generating equivalent fractions, which reflects well developed embodiment-independent thought. Our data suggest that initially this student could only make a single bidirectional translation, but was unable to keep this information in short-term memory STM when making a second bidirectional mode translation. Later, he was able to make two bidirectional translations and the relational judgment between embodiments, but could not coordinate this information to make a relational inference from the embodiments to the fraction symbols. Whether a bidirectional translation is accomplished and stored in STM as one or two separate cognitive units cannot be determined from our data. If, however, such translations are stored as two units, rather than as an integrated schemata, the whole sequence of coordinating the translations may exceed the STM capacity. Whatever the case, the child who cannot coordinate such translations is seriously handicapped in abstracting information from the embodiment system of representation. This has implications for curriculum, because such shortcomings would inhibit her or him from making judgments, performing transformations, and operating in the mathematical symbol system of representation. Such a child might need more practice in making paired unidirectional translations between modes of representation until the translations become habituated, automated, schematized. Children who have difficulty with transformations on embodiments almost surely will have difficulty making meaningful transformations on mathematical symbols Behr et al. Results such as these have rather direct implications for redeveloping fraction-related curriculum in order and equivalence situations. First, a rather dramatic tie between embodiments and symbols has been suggested. Second, this study provides guidance as to the nature and sequencing of manipulative-based actions and the subsequent transition to mathematical symbols. Third, the study directs the attention of the curriculum developer away from the attainment of individual tasks toward the development of more global cognitive processes, in this case flexibility in coordinating translations and the emergence of embodiment-independent thought. Concern with such goals in the school mathematics curriculum will result in very different types of student activities. Many fourth- and fifth-grade children found continuous interpretations of rational number more difficult than discrete interpretations. We believe this occurred because in the discrete situation children used well-developed counting strategies a regression , whereas the continuous situations required the use of newly acquired, and as yet not fully functioning, partitioning strategies: The situation became even more difficult when applied to a circular region, probably because the symmetry and completeness of a circle is more compelling than with a rectangle. We found that children had more difficulty finding one third of a circle divided in half than they did finding one third of a set of six counters divided into two groups of three. In the former situation, it is necessary to employ repartitioning strategies, which were at the time unstable for many students. In the latter case, we found students solving the problem by dividing six by three and responding that the answer was three without touching the chips. This perhaps should not be surprising, because it is an example of students regressing to a strategy that already has been internalized and that is based on familiar variations on the counting schema.

Chapter 2 : Expanding the curriculum in the s | History of The Open University | Open University

Expanding Curriculum Research and Understanding discusses the use of multiple research approaches (paradigms) to inquire into all aspects of curriculum (the knowledge base of schooling), with the goal of understanding the processes and the substantive dimensions of curriculum.

A Perkins student working in the student store. For a student who is blind, learning about world geography from books is not enough. That student must also learn orientation and mobility skills and practice using a white cane for safe, independent travel. The expanded core curriculum empowers students with disabilities to access their education and make their own choices throughout life. Whether they are socializing and learning to handle money in the student store, finding their own way to classrooms across campus, or playing adapted sports in gym class, students are building a foundation for success in life at Perkins and beyond. While sighted children use visual experiences throughout their lives to learn concepts casually or incidentally, students who are visually impaired with or without additional disabilities cannot rely on sensory observations. The foundational skills they need for daily life in school, at home, and in the community, must be strategically taught and integrated into all aspects of their education. The ECC areas include: Rife explained how one activity can be used to practice several components in the expanded core curriculum. To prepare lunch, students must plan the meal, shop for ingredients, and help out in the kitchen with everything from chopping carrots to cleaning dishes. The assignment requires students to practice orientation and mobility, independent living skills including handling money and cooking, reading recipes in braille, social interaction, and self-determination. Through Perkins Outreach Services , public school students can participate in weekend, vacation, and summer programs providing training and reinforcement in various ECC areas. By taking a succession of summer courses through Outreach, Rife said, students can build vital ECC skills while working towards a higher level of independence. Parents are constantly surprised, Caruso observes, by the level of independence their children are able to achieve when given the chance to do things for themselves in a safe and fun environment. Families have busy schedules, and parents can get in the habit of doing things for their children rather than taking the time to step back and let them try. Caruso outlined time saving strategies such as advising parents to sit down with their child on Sunday night to choose outfits for the week, creating more time to let their child independently dress for school in the mornings. LaVenture stressed the importance of educating parents about the expanded core curriculum to help them advocate for educational resources. Sometimes parents of children with visual impairments, including those with additional disabilities, do not have expectations that their children will be able to do things like play sports or cook their own meal. Once they realize how everything from recreational activities to household chores can be adapted, parents can begin encouraging their children to do more independently. A Certified Vision Rehabilitation Therapist CVRT can help parents make simple and practical adaptations at home such as organizing the kitchen area and using braille labels on household items, LaVenture said. By making adaptations that allow children with disabilities to practice everyday tasks independently, parents help their children build confidence in their own abilities. LaVenture talked about the value of families connecting with other families of children with visual impairment, including those with additional disabilities. Through conferences, workshops and programs like Perkins Outreach, family members learn new strategies on a peer to peer basis and see how other families adapt to overcome obstacles. After 28 years of experience teaching and working as an administrator, Dorinda Rife believes strongly in empowering students with disabilities to make their own decisions. Self-determination refers to students recognizing their own abilities and becoming their own advocates. Orientation and Mobility Skills to orient children who are visually impaired to their surroundings and travel skills to enable them to move independently and safely in the environment. Social Interaction Skills Since nearly all social skills are learned by observation of the environment and people, this is an area where students with vision loss need careful, conscious and explicit instruction. Independent Living Skills This area includes the tasks and functions people perform in daily life to optimize their independence - skills such as personal hygiene, food preparation, money management, and household chores. Career Education Students with vision loss benefit most from an experiential learning approach. Sensory Efficiency Skills Skills that help students use the senses â€" including any functional vision, hearing, touch, smell, and taste â€" to access skills related to literacy and concept development. Self-Determination Skills to enable students to become effective advocates for themselves based on their own needs and goals.

Chapter 3 : Theory and Why It is Important - Social and Behavioral Theories - e-Source Book - OBSSR e-S

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Seven Principles During the last four decades, scientists have engaged in research that has increased our understanding of human cognition, providing greater insight into how knowledge is organized, how experience shapes understanding, how people monitor their own understanding, how learners differ from one another, and how people acquire expertise. From this emerging body of research, scientists and others have been able to synthesize a number of underlying principles of human learning. This growing understanding of how people learn has the potential to influence significantly the nature of education and its outcomes. Our appraisal also takes into account a growing understanding of how people develop expertise in a subject area see, for example, Chi, Feltovich, and Glaser, ; NRC, b. Understanding the nature of expertise can shed light on what successful learning might look like and help guide the development of curricula, pedagogy, and assessments that can move students toward more expert-like practices and understandings in a subject area. The design of educational programs is always guided by beliefs about how students learn in an academic discipline. Whether explicit or implicit, these ideas affect what students in a program will be taught, how they will be taught, and how their learning will be assessed. Thus, educational program designers who believe students learn best through memorization and repeated practice will design their programs differently from those who hold that students learn best through active inquiry and investigation. The model for advanced study proposed by the committee is supported by research on human learning and is organized around the goal of fostering Page Share Cite Suggested Citation: The National Academies Press. Learning with understanding is strongly advocated by leading mathematics and science educators and researchers for all students, and also is reflected in the national goals and standards for mathematics and science curricula and teaching American Association for Advancement of Science [AAAS], , ; National Council of Teachers of Mathematics [NCTM], , , ; NRC, The committee sees as the goal for advanced study in mathematics and science an even deeper level of conceptual understanding and integration than would typically be expected in introductory courses. Guidance on how to achieve learning with understanding is grounded in seven research-based principles of human learning that are presented below see Box These principles also serve as the foundation for the design of professional development, for it, too, is a form of advanced learning. While it could be argued that all components of the educational system e. Although this framework was developed to assess current programs of advanced study, it also can serve as a guide or framework for those involved in developing, implementing, or evaluating new educational programs. Principled Conceptual Knowledge Learning with understanding is facilitated when new and existing knowledge is structured around the major concepts and principles of the discipline. Highly proficient performance in any subject domain requires knowledge that is both accessible and usable. A rich body of content knowledge about a subject area is a necessary component of the ability to think and 1 The research on which these principles are based has been summarized in How People Learn: Page Share Cite Suggested Citation: Learners use what they already know to construct new understandings. Learning is facilitated through the use of metacognitive strategies that identify, monitor, and regulate cognitive processes. Learners have different strategies, approaches, patterns of abilities, and learning styles that are a function of the interaction between their heredity and their prior experiences. The practices and activities in which people engage while learning shape what is learned. Learning is enhanced through socially supported interactions. Therefore, curriculum and instruction in advanced study should be designed to develop in learners the ability to see past the surface features of any problem to the deeper, more fundamental principles of the discipline. Even students who prefer to seek understanding are often forced into rote learning by the quantity of information they are asked to absorb. Prior Knowledge Learners use what they already know to construct new understandings. When students come to advanced study, they already possess knowledge, skills, beliefs, concepts, conceptions, and misconceptions that can significantly influence how they think about the world, approach new learning, and go about solving unfamiliar problems Wandersee, Mintzes, and Novak, People construct meaning for a new idea or process by relating it to ideas or processes they already understand. This prior knowledge can produce mistakes, but it can also produce correct insights. Some of this knowledge base is discipline specific, while some may be related to but not explicitly within a discipline. Research on cognition has shown that successful learning involves linking new knowledge to what is already known. These links can take different forms, such as adding to, modifying, or reorganizing knowledge or skills. How these links are made may vary in different subject areas and among students with varying talents, interests, and abilities Paris and Ayers, Learning with understanding, however, involves more than appending new concepts and processes to existing knowledge; it also involves conceptual change and the creation of rich, integrated knowledge structures. Thus, lecturing to students is often an ineffective tool for producing conceptual change. For example, Vosniadou and Brewer describe how learners who believed the world is flat perceived the earth as a three-dimensional pancake after being taught that the world is a sphere. Moreover, when prior knowledge is not engaged, students are likely to fail to understand or even to separate knowledge learned in school from their beliefs and observations about the world outside the classroom. Effective teaching involves gauging what learners already know about a subject and finding ways to build on that knowledge. When prior knowledge contains misconceptions, there is a need to reconstruct a whole relevant framework of concepts, not simply to correct the misconception or faulty idea. Effective instruction entails detecting those misconceptions and addressing them, sometimes by challenging them directly Caravita and Hallden, ; Novak, The central role played by prior knowledge in the ability to gain new knowledge and understanding has important implications for the preparation of students in the years preceding advanced study. To be successful in advanced study in science or mathematics, students must have acquired a sufficient knowledge base that includes concepts, factual content, and relevant procedures on which to build. This in turn implies that they must have had the opportunity to learn these things. Many students, however, particularly those who attend urban and rural schools, those who are members of certain ethnic or racial groups African American, Hispanic, and Native American , and those who are poor, are significantly less likely to have equitable access to early opportunities for building this prerequisite knowledge base Doran, Dugan, and Weffer, ; see also Chapter 2 , this volume. Inequitable access to adequate preparation can take several forms, including 1 lack of appropriate courses Ekstrom, Goertz, and Rock, ; 2 lack of qualified teachers and high-quality instruction Gamoran, ; Oakes, ; 3 placement in low-level classes where the curriculum focuses on less rigorous topics and low-level skills Burgess, , ; Nystrand and Gamoran, ; Oakes, ; 4 lack of access to resources, such as high-quality science and mathematics facilities, equipment, and textbooks Oakes, Gamoran, and Page, ; and 5 lack of guidance and encouragement to prepare for advanced study Lee and Ekstrom, Students who lack opportunities to gain important knowledge and skills in the early grades may never get to participate in advanced classes where higher-order skills are typically taught Burnett, Metacognition Learning is facilitated through the use of metacognitive strategies that identify, monitor, and regulate cognitive processes. To be effective problem solvers and learners, students need to determine what they already know and what else they need to know in any given situation. They must consider both factual knowledgeâ€"about the task, their goals, and their abilitiesâ€"and strategic knowledge about how and when to use a specific procedure to solve the problem at hand Ferrari and Sternberg, In other words, to be effective problem solvers, students must be metacognitive. Empirical studies show that students who are metacognitively aware perform better than those who are not Garner and Alexander, ; Schoenfeld, For example, research demonstrates that students with better-developed metacognitive strategies will abandon an unproductive problem-solving strategy very quickly and substitute a more productive one, whereas students with less effective metacognitive skills will continue to use the same strategy long after it has failed to produce results Gobert and Clement, The basic metacognitive strategies include 1 connecting new information to former knowledge; 2 selecting thinking strategies deliberately; and 3 planning, monitoring, and evaluating thinking processes Dirkes, Experts have highly developed metacognitive skills related to their specific area of expertise. If students in a subject area are to develop problem-solving strategies consistent with the ways in which experts in the discipline approach problems, one important goal of advanced study should be to help students become more metacognitive. Having students construct concept maps 2 for a topic of study can also provide powerful metacognitive insights, especially when students work in teams of three or more see Box for a discussion of concept maps. Differences Among Learners Learners have different strategies, approaches, patterns of abilities, and learning styles that are a function of the interaction between their heredity and their prior experiences. Individuals are born with potential that develops through their interaction with their environment to produce their current capabilities and talents. Thus among learners of the same age, there are important differences in cognitive abilities, such as linguistic and spatial aptitudes or the ability to work with symbolic quantities representing properties of the natural world, as well as in emotional, cultural, and motivational characteristics. Additionally, by the time students reach high school, they have acquired their own preferences regarding how they like to learn and at what pace. Thus, some students will respond favorably to one kind of instruction, whereas others will benefit more from a different approach. Annex illustrates some of the ways in which curriculum and instruction might be modified to meet the learning needs of high-ability learners. Appreciation of differences among learners also has implications for the design of appropriate assessments and evaluations of student learning. Students with different learning styles need a range of opportunities to demonstrate their knowledge and skills. For example, some students work well 2 Concept maps are two-dimensional, hierarchical representations of concepts and relationships between concepts that model the structure of knowledge possessed by a learner or expert. The constructivist epistemology underlying concept maps recognizes that all knowledge consists of concepts, defined as perceived regularities in events or objects or their representation, designated by a label, and propositions that are two or more concepts linked semantically to form a statement about some event or object. Free software that aids in the construction of concept maps is available at www. Figure was made at the beginning of the study of meiosis and shows that the student did not know how to organize and relate many of the relevant concepts. The student equated meiosis with sexual reproduction and was not clear on how meiosis relates to homologous chromosomes. These maps are presented without editing. The student now has integrated the meanings of meiosis and sexual reproduction, homologous chromosomes, and other concepts. While some concept meanings still appear a bit fuzzy, the student has clearly made progress in the development of understanding, and his knowledge structure can serve as a good foundation for further study. Some excel at recalling information, while others are more adept at performance-based tasks. Some express themselves well in writing, while others do not. Humans are motivated to learn and to develop competence Stipek, ; White, Motivation can be extrinsic performance oriented , for example to get a good grade on a test or to be accepted by a good college, or intrinsic learning oriented , for example to satisfy curiosity or to master challenging material. Intrinsic motivation is enhanced when learning tasks are perceived as being interesting and personally meaningful and are presented at the proper level of difficulty. A task that is too difficult can create frustration; one that is too easy can lead to boredom. Some beliefs about learning are quite general. For example, some students believe their ability to learn a particular subject or skill is predetermined, whereas others believe their ability to learn is substantially a function of effort Dweck, Believing that abilities are developed through effort is most beneficial to the learner, and teachers and others should cultivate that belief Graham and Weiner, ; Weiner, A belief in the value of effort is especially important for students who are traditionally underrepresented in advanced study. Several recent studies document the power of a high school culture that expects all students to spend time and effort on academic subjects and is driven by a belief that effort will pay off in high levels of academic achievement for everyone, regardless of prior academic status, family background, or future plans. In such settings, remediation of skill deficits takes on a different character, teachers are able and willing to provide rigorous academic instruction to all students, and all students respond with effort and persistence Bryk, Lee, and Holland, ; Lee, ; Lee, Bryk, and Smith, ; Lee and Smith, ; Marks, Doane, and Secada, ; Rutter, Situated Learning The practices and activities in which people engage while learning to shape what is learned. Research on the situated nature of cognition indicates that the way people learn a particular domain of knowledge and skills and the context in which they learn it become a fundamental part of what is learned Greeno, ; Lave, When students learn, they learn both information and a set of practices, and the two are inextricably related. Because the practices in which students engage as they acquire new concepts shape what and how the students learn, transfer is made possible to the extent that knowledge and learning are grounded in multiple contexts Brown, Collins, and Duguid, Transfer is more difficult when a concept is taught in a limited set of contexts or through a limited set of activities. When concepts are taught only in one context, students are not exposed to the varied practices associated with those concepts. It is only by encountering the same concept at work in multiple contexts that students can develop a deep understanding of the concept and how it can be used, as well as the ability to transfer what has been learned in one context to others Anderson, Greeno, Reder, and Simon, If the goal of education is to allow learners to apply what they learn in real situations, learning must involve applications and take place in the context of authentic activities Brown et al. Brown and colleagues , p. Brown and colleagues offer a somewhat different definition: Regardless of which definition is adopted, the importance of situating learning in authentic activities is clear. Collins notes the following four specific benefits: Teachers can engage learners in important practices that can be used in different situations by drawing upon real-world exercises, or exercises that foster problem-solving skills and strategies that are used in real-world situations.

Chapter 4 : What will I do to help students practice and deepen their understanding of new knowledge?

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Keq calculations are shown. The teacher demonstrates color changes in a reversible reaction. Student misconceptions about the nature of equilibrium remain uncovered and unchallenged. The teacher poses a question: The common student misconception that equilibrium means equal amounts in each container is challenged as students develop an understanding of the principle of equilibrium. Page Share Cite Suggested Citation: The National Academies Press. It is important to note, however, that assessment does not exist in isolation, but is closely linked to curriculum and instruction Graue, Thus as emphasized earlier, curriculum, assessment, and instruction should be aligned and integrated with each other, and directed toward the same goal Kulm, ; NCTM, ; Shepard, In advanced mathematics and science, that goal is learning with understanding. This section reviews design principles for two types of assessments: To guide instruction, teachers need assessments that provide specific BOX Reliability, Validity, and Fairness Reliability generally refers to the stability of results. For example, the term denotes the likelihood that a particular student or group of students would earn the same score if they took the same test again or took a different form of the same test. Reliability also encompasses the consistency with which students perform on different questions or sections of a test that measure the same underlying concept, for example, energy transfer. Validity addresses what a test is measuring and what meaning can be drawn from the test scores and the actions that follow Cronbach, It should be clear that what is being validated is not the test itself, but each inference drawn from the test score for each specific use to which the test results are put. Thus, for each purpose for which the scores are used, there must be evidence to support the appropriateness of inferences that are drawn. Fairness implies that a test supports the same inferences from person to person and group to group. Thus the test results neither overestimate nor underestimate the knowledge and skills of members of a particular group, for example, females. Fairness also implies that the test measures the same construct across groups. Based on a model of cognition and learning that is derived from the best available understanding of how students represent knowledge and develop competence in a domain. Designed in accordance with accepted practices that include a detailed consideration of the reliability, validity, and fairness of the inferences that will be drawn from the test results see Box This is especially important when the assessment carries high stakes for students, teachers, or schools. Aligned with curriculum and instruction that provide the factual content, concepts, processes, and skills the assessment is intended to measure so the three do not work at cross-purposes. Designed to include important content and process dimensions of performance in a discipline and to elicit the full range of desired complex cognition, including metacognitive strategies. Multifaceted and continuous when used to assist learning by providing multiple opportunities for students to practice their skills and receive feedback about their performance. Designed to assess understanding that is both qualitative and quantitative in nature and to provide multiple modalities with which a student can demonstrate learning. Of primary importance if a test is to support learning is that students be given timely and frequent feedback about the correctness of their understandings; in fact, providing such feedback is one of the most important roles for assessment. There is a large body of literature on how classroom assessment can be designed and used to improve learning and instruction see for example, Falk ; Shepard ; Wiggins, ; Niyogi, Concept maps, such as those discussed in Box in Chapter 6 , are one example of an assessment strategy that can be used to provide timely Page Share Cite Suggested Citation: End-of-course tests are too broad and too infrequently administered to provide information that can be used by teachers or students to inform decisions about teaching or learning on a day-to-day basis. Thus, the content of the tests should be matched to challenging learning goals and subject matter standards and serve to illustrate what it means to know and learn in each of the disciplines. Because advanced study programs in the United States are strongly influenced by high-stakes assessment, the committee is especially concerned with how this form of assessment can be structured to facilitate learning with understanding. It is well known that such assessments, even coming after the end of instruction, inevitably have strong anticipatory effects on instruction and learning. Thus if high-stakes assessments fail to elicit complex cognition and other important learning outcomes, such as conceptual understanding and problem solving, they may have negative effects on the teaching and learning that precede them. In designing such assessments, then, both psychometric qualities and learning outcomes should be considered. If end-of-course tests are to measure important aspects of domain proficiency, test makers need to have a sophisticated understanding of the target domain. They must understand the content and the process dimensions that are valued in the discipline and then design the test to sample among a broad range of these dimensions Millman and Greene, Doing so is complicated, however, by the fact that an assessment can only sample from a large universe of desirable learning outcomes and thus can tap but a partial range of desirable cognitions. Consequently, concerns will always arise that a particular assessment does not measure everything it should, and therefore the inferences drawn from it are not valid. Similarly, the selection of tasks for an assessment may be criticized for measuring more than is intended; an example is word problems on mathematics tests that require high levels of reading skill in addition to the mathematics ability that is the target of the assessment. To ensure the validity of inferences drawn from tests, a strong program of validity research must be conducted on all externally designed and administered tests. Assessments that invoke complex thinking should target both general forms of cognition, such as problem solving and inductive reasoning, and forms that are more domain-specific, such as deduction and proof in mathematics or the systematic manipulation of variables in science. Given that the goals of curriculum and assessment for advanced study are to promote deep understanding of the underlying concepts and unifying themes of a discipline, effective assessment should reveal whether students truly understand those principles and can apply their knowledge in new situations. The ability to apply a domain principle to an unfamiliar problem, to combine ideas that originally were learned separately, and to use knowledge to construct new products is evidence that robust understanding has been achieved Hoz, Bowman, and Chacham, ; Perkins, Meaningful assessment also includes evidence of understanding that is qualitative and quantitative in nature, and provides multiple modalities and contexts for demonstrating learning. Using multiple measures rather than relying on a single test score provides a richer picture of what students know and are able to do. The characteristics of assessments that support learning with understanding are presented in Table This observation is particularly true when one is implementing well-structured external programs that build on the regular curriculum already in place at a school. Such change cannot occur unless teachers are given ample opportunity and support for continual learning through sustained professional development, as Page Share Cite Suggested Citation:

Chapter 5 : Program 2: Understanding Research

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Multicultural Curriculum What is multicultural education? Multicultural education is designed to prepare students for citizenship in a democratic society by teaching them to consider the needs of all individuals. Why do we need a multicultural curriculum? To prepare students for diverse workplaces and multicultural environments To expose biases, stereotypes, and policies that can restrict achievement To ensure that content is fair, accurate, and inclusive To accomodate for diverse teaching and learning styles of teachers and students To help students, faculty, and staff become advocates for multicultural awareness What does a multicultural curriculum look like? Curriculum from any subject area may be altered to include multicultural content. Expanding curriculum to include a variety of perspectives not only allows educators to discuss views and ideas that are less common or underrepresented, but also provides students a more holistic understanding of the subject area. Furthermore, positive role models from a variety of different backgrounds and cultural groups can be included. Another way to reform curriculum is to discuss social issues. Educators can transform their classrooms by fostering an environment where students can ponder ideas such as what it means to be an active citizen, how discrimination and prejudice negatively affect democratic society, or how they can become more sensitive and respectful to social differences. Multicultural lesson plans should encourage students to develop critical thinking skills, as well as increase their self-understanding. Educators can best encourage this development by modeling critical thinking situations. When students learn to recognize their values, feelings, privileges, and biases, they become more self-aware. How should a curriculum be changed to be more multicultural? Five stages have been proposed for multicultural curriculum reform see source by Paul C. Educators should compare the stages to their current practices and consider ways to improve their curriculua. Higher stages represent greater multicultural competence. The process of bringing multicultural components into a curriculum may include participating in a multicultural seminar or workshops, examining current course content, obtaining support from colleagues, and undertaking necessary personal examination and change. Recognition Educators must first recognize that the traditional curriculum is not the only content needed. Mainstream curriculum does not include ideas and experiences representing contemporary diverse society. Educators must recognize their own biases, prejudices, and assumptions that may affect their teaching and ultimately influence their students. As they work towards eliminating these biases, they may become more effective in teaching, have more multicultural curriculum, and be more likely to reach all students. The process of recognizing biases and working to eradicate them is ongoing. Heroes and Holidays After recognizing the need for curriculum reform, educators may begin to integrate other perspectives by celebrating cultural holidays and highlighting famous individuals from non-dominant groups, drawing attention to the fact that society is shaped by multiple perspectives. But they should not stop at this point. Integration Moving beyond superficial integration, educators need to integrate information about non-dominant groups across several areas of the curriculum. A daily lesson plan may incorporate a special lesson, book, or film that highlights members of non-dominant groups. Educators must move beyond using the new materials and units only as secondary sources. Structural Reform During this stage educators weld diverse perspectives and multicultural materials into their traditional curriculum. This unit is seamless to ensure that one source of information is not seen as primary over or more accurate than another. Educators can encourage students to understand these concepts based on experiences and increased self-awareness and to develop their own views. What links can take me to further information?

Chapter 6 : Expanding Curriculum Research and Understanding: A Mytho-Poetic Perspective by Nelson L.

Expanding Curriculum Research and Understanding: A Mytho-Poetic Perspective (Counterpoints Studies in the

Postmodern Theory of Education) (Paperbac (size cm x cm x cm) for - Compare prices of products in Books from Online Stores in Australia.

Chapter 7 : Understanding Understanding

RESEARCH ARTICLE Expanding approaches for understanding impact: integrating technology, curriculum, and open educational resources in science education.

Chapter 8 : Multicultural Curriculum | BYU McKay School of Education

Nelson L. Haggerson is the author of Expanding Curriculum Research and Understanding (avg rating, 1 rating, 1 review, published), Oh Yes I Can!.

Chapter 9 : Research - Expanding Expression

Expansion was a keyword for The Open University during the s, and this included in the curriculum. New areas of study included English law (in association with the College of Law), modern languages and expanded programmes in most other faculties and schools.