

Pedagogical Fit:
An Analysis of the Design of
Time To Know

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Background

Organizing Questions

Time To Know (T2K) is the teacher's platform for the digital classroom. Time To Know puts the teacher at the center of teaching with a comprehensive digital curriculum in mathematics and reading and language arts designed around social constructivist principles. Time To Know supports teachers with robust tools for curriculum planning, classroom management, and student assessment. Students build a repertoire of basic skills along with higher-order cognitive problem solving that prepares them for high-stakes tests.

The pedagogy of T2K is designed on principles of social constructivist learning that use open-ended applets, collaborative projects, and group discussions to guide students through the development of skills and concepts. In this paper, we analyze the basic qualities of the T2K pedagogy to see how it fits with contemporary statements of pedagogical best practice. To guide our analysis, we investigated two questions:

Does the pedagogy of T2K fit with the prevailing models of best-teaching practice?

If teachers use T2K, will they be using an acceptable and effective teaching approach?

Sources

To answer these questions of pedagogical fit, we looked in several places for definitions of best practices:

The Texas Department of Education

In Texas, the **Professional Development Appraisal System** is used as a guide to annual teacher observations. It provides insights into best-practice teaching.

The Massachusetts Department of Education

Some states mention specific teaching practice guidelines in their curriculum statements. The Massachusetts Curriculum Frameworks is one, providing precise statements about teaching in mathematics and reading. We used these statements from Massachusetts in our analysis as a representative of the language of pedagogy in the state standards.

Educational research on teaching math and reading

We reviewed the educational research literature for guidelines about what constitutes effective practice. We summarize these findings in our analysis.

Findings

Generally speaking, there is a close fit between the qualities of best-practice teaching, as described in these various sources, and the pedagogical design of the Time To Know product. In the pages that follow, we will highlight some of the features of T2K to support this claim.

General Pedagogy

Texas — Professional Development Appraisal System

We carefully reviewed the Texas Education Agency web site for indications about what constitutes best-practice teaching. We did not find specific regulations in Texas, but we did find guidelines for teaching in the form of an observation checklist.

In Texas, teachers must be observed and appraised each year. Districts often use a set of guidelines called the Professional Development Appraisal System (PDAS) to structure these observations. The PDAS consists of a checklist of the characteristics of high-quality teaching.

What follows is a synopsis of statements taken from the PDAS along with a summary of the related features of T2K. We find that T2K matches these statements and that a teacher using T2K would receive a high score on the PDAS.

Attributes of the PDAS

The PDAS lists a number of attributes that it associates with high-quality teaching.

PDAS: Engage students actively in learning.

T2K provides many opportunities for actively learning in math through the applets that students use to explore concepts and develop rules and patterns. In reading, the Text Reader, the LiveText function and various text display options with interactive question formats make reading an interactive pursuit.

PDAS: Challenge students to learn at a high cognitive level.

T2K is built on constructivist principles that bring learning to a high cognitive level appropriate to each student. The curriculum includes many instances of graphic organizers and performance task templates to provide structure for high-level thinking.

PDAS: Vary the learning activities.

T2K provides a variety of learning activities ranging from the open-ended explorations of applets to practice experiences, assessment, and games.

PDAS: Structure activities so that students are self-directed.

T2K combines teacher-led demonstrations and discussions with individual student work. In these activities, students work independently, set their own pace, and bring their own judgment to their work.

PDAS: Identify appropriate goals and objectives.

Each unit in the curriculum begins with clearly stated objectives. These objectives are, in turn, aligned to state standards.

PDAS: Teach basic knowledge, skills, central themes, and concepts.

The comprehensive curriculum of T2K includes high-level themes and concepts, specifics of basic knowledge and core skills. By following the curriculum as provided, or by modifying it, teachers can be confident they are covering all of the concepts and skills.

PDAS: Maintain appropriate pacing and sequencing.

The sequencing of lessons is built into the lesson planning function of T2K. To assure that pacing is appropriate to each student, teachers can use the activity assignment tool to differentiate instruction to meet the needs of individuals.

PDAS: Use technology effectively. Manage time and materials effectively.

All of the tools of T2K are designed to be used efficiently in the classroom and to make the best use of that time. With practice and professional development, teachers become adept at marshalling these resources.

Mathematics Pedagogy

Massachusetts Curriculum Framework

Like Texas, many states do not specify pedagogical practice. However, a number of states specifically describe pedagogy in their curriculum standards. We selected Massachusetts for an example of language from state standards that can add breadth to our analysis of best-practice pedagogy.

Massachusetts includes in its Mathematics Curriculum Frameworks (2000) a number of “Guiding Principles” that define quality curriculum and instruction.

Massachusetts Curriculum Framework: Mathematical ideas should be explored in ways that stimulate curiosity, create enjoyment of mathematics, and develop depth of understanding. Students should be actively engaged in doing meaningful mathematics, discussing mathematical ideas, and applying mathematics in interesting, thought provoking situations.

T2K is designed on constructivist principles that involve students in doing meaningful mathematics through the use of open-ended applets, motivating animations, and real-world problem solving. Students share and discuss their work using the Gallery.

Massachusetts Curriculum Framework: Activities should build upon curiosity and prior knowledge, and should enable students to solve progressively deeper, broader, and more sophisticated problems.

The structure of the T2K curriculum includes a sequence of lessons that build concepts in a logical way.

Massachusetts Curriculum Framework: An effective mathematics program focuses on problem solving and requires teachers who have a deep knowledge of mathematics as a discipline.

T2K places a premium on the processes of questioning, data analysis and problem solving. The professional development program of T2K includes many opportunities for teachers to develop a deep understanding of mathematics.

Massachusetts Curriculum Framework: Technology is an essential tool in a mathematics education.

T2K gives teachers a powerful technology for teaching math and for managing student learning.

Research in Mathematics Education

The research literature also establishes the qualities of effective teaching. See Whitehurst for a discussion of the importance of research evidence in education (2004). For our analysis in mathematics we consulted the recent report of the National Mathematics Advisory Panel (2008) that lists many factors that contribute to effective teaching in mathematics.

Math Panel: Curriculum must simultaneously develop conceptual understanding, computational fluency, and problem-solving skills. These attributes are mutually supportive.

T2K curriculum combines large group presentations, small group projects and individual practice opportunities. Together these components combine deep understanding and problem solving with fluency with computation.

Math Panel: Curriculum must provide sufficient practice and in fact few US curricula do so. Pedagogy should develop proficiency in students. Proficiency means that students understand the key concepts, achieve automaticity, develop flexible, accurate, automatic execution of standard algorithms, and use these competencies to solve problems.

T2K includes many practice experiences for students to hone their skills with specific concepts. These exercises are graded in difficulty and can be assigned individually to students. Those assignments can be adjusted during class based on student performance on assessments.

Math Panel: Best practice teaching should not be entirely “student-centered” or entirely “teacher-centered” but some combination of the two.

T2K combines the best of a student-centered and a teacher-centered pedagogy in a system of strong formative assessment and timely reports.

Math Panel: Formative assessment is important, if teachers use the assessment data properly to differentiate instruction. Using technology, teachers can administer frequent formative assessment and use the data to individualize.

T2K builds many formative assessment opportunities into the activities that are assigned to students. Because students are working on computers, the results of these assessments are immediately available to the teacher who can make adjustments to student assignments quickly and provide feedback when it is most needed.

Reading and Language Arts Pedagogy

The Massachusetts Curriculum Framework

Massachusetts English Language Arts Curriculum Frameworks (2001) define an effective English language arts curriculum as having a number of qualities.

Massachusetts Curriculum Framework: Develops thinking and language together through interactive learning.

T2K makes intensive use of interactive tools in reading and language arts through its Text Reader, the LiveText function, and various text display options with interactive question formats.

Massachusetts Curriculum Framework: Draws on literature from many genres, time periods, and cultures.

T2K provides many reading and writing opportunities from a variety of genres.

Massachusetts Curriculum Framework: Emphasizes writing as an essential way to develop, clarify, and communicate ideas in persuasive, expository, narrative, and expressive discourse. It provides explicit skill instruction in reading and writing.

Writing is an important element in the reading language arts curriculum of T2K and students are given many opportunities to practice the necessary skills. Students also work with graphic organizers and performances tasks. The Gallery feature provides the platform for oral language and discussion.

Massachusetts Curriculum Framework: Teaches the strategies necessary for acquiring academic knowledge, achieving common academic standards, and attaining independence in learning.

T2K provides reading opportunities that generate new knowledge. It covers the skills of research and report writing. Throughout, T2K provides graded exercises and passages that let students work independently at an appropriate level.

Research in Reading Education

The National Reading Panel published a summary statement of what the research tells us about teaching reading (2000). The panel concludes that teaching reading should emphasize direct instruction in the reading and writing skills needed to perform complex literary tasks. The report identifies five specific skills.

Decoding: Provide intensive intervention to build the skills of identifying words, recognizing syllable patterns, phonemic awareness, and phonics.

Morphology: Teach specific details of word structure to expand the patterns that students understand.

Fluency: Develop the ability to read with appropriate speed, accuracy, and intonation.

Vocabulary: Expand the list of words that students recognize and understand when reading; develop strong speaking vocabulary.

Text comprehension: Develop the skills readers need to summarize text, clarify misunderstanding, or generate questions.

T2K covers all five components of effective reading instruction. Its adaptive platform and interactive games support decoding, fluency, vocabulary and text comprehension. Specific activities in the digital curriculum deal with issues of morphology, vocabulary and text comprehension. The adaptive technology in T2K matches the challenges in these activities to the abilities of each student.

For example, a series of cloze activities ask students to fill in blanks, as an exercise of their decoding skills and vocabulary. In sorting activities, they categorize according to specific concepts. Matching and memory games exercise students' word recognition, decoding, morphology, and vocabulary skills.

T2K includes a Text Reader function that provides the student with an interactive book that can narrate text and highlighting the text at the same time. This focuses students on the text and builds the skills of fluency and comprehension.

The Live Text function provides another kind of interaction with a text. Using Live Text, students highlight words or sentences, answer questions, select "Hot" words for additional information, or navigate through linguistic items. With each of these interactions, the student receives feedback on accuracy and meaning.

Research also indicates that four other areas are critical to literacy in the upper primary and middle school grades (National Institute for Literacy, 2007).

Assessment: Summative assessment (chapters tests, final exams, and the like) measure achievement. More important to classroom instruction are the formative and diagnostic assessments administered frequently by the teacher. Teacher questioning and observation are simple, direct formative assessments that can guide instruction on a moment-to-moment basis.

Writing: Student writing is related to reading skill; improving a student's writing skill improves their capacity to learn generally. Writing is developed through direct,

explicit and systematic instruction in related sub-skills, such as prewriting, organizing, reviewing and revising.

Motivation: Students can be motivated with clear goals and expectations, as well as a focus on self-guiding performance. Variety in reading materials and opportunities to interact through reading are also valuable experiences.

The needs of diverse learners: Instruction must respond to the many different needs of students in the classroom. Variety of presentational styles, breaking information down into smaller segments, and extended periods for speaking are productive.

T2K automatically tracks all student work and in so doing it provides many opportunities in each lesson for the teacher to assess student learning. T2K includes a complete end-of-unit assessment function as well.

Each unit is introduced with a motivating animation that poses a question to structure the work of that unit. Writing tasks are embedded throughout, using a free-writing template that students use to complete open-ended assignments.

Each unit ends with a performance task in which students use their reading and writing skills to demonstrate what they have learned in that unit. For example, at the conclusion of a unit on note-taking skills, in which they read about explorers, students complete a performance task. They develop a multimedia product that describes the kind of explorer they want to be and write an expository paragraph explaining their choice.

Some units use a cognitive map tool as the basis of a performance task. For instance, students create a character map of the protagonist in the story “Chocolate Touch” drawing on their understanding of the concept of character traits.

Throughout these activities, T2K provides the ability to assign individually all aspects of the work. This makes T2K a powerful tool for meeting the needs of diverse learners.

Concluding Remarks

In this analysis of best-practice teaching we have reviewed descriptions from a variety of sources, ranging from a teacher observation checklist from Texas, statements from the learning standards from one state, Massachusetts, and research findings from two national panels. Of course, there are many other sources of ideas about what constitutes best-practice teaching, but these seem like a diverse sample to start with.

Generally speaking, we find a close fit between the qualities of best-practice teaching, as described in these sources, and the pedagogical design of the Time To Know product. We think it is reasonable to conclude that a teacher using T2K in the classroom will exhibit many of the practices of effective pedagogy.

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