

**Analysis of
Professional Learning
for Time To Know®**

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Introduction

Background

Time To Know (T2K) is the teacher's platform for the digital classroom. It 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.

T2K also offers a comprehensive program of teacher professional learning that is designed to build teachers' competence with the technology and to foster a deeper understanding of the pedagogy of guided social constructivism.

Analysis of the T2K Professional Learning

T2K provides teachers with a powerful set of tools and a rich curriculum designed on social constructivist principles. The complete platform – powerful software, curriculum content, wireless laptop computers for every student, and a teacher's work station and projector – fosters new learning opportunities; but it also requires new teaching skills. For both the beginning teacher and the experienced veteran, making the transition to this technology-rich environment demands an appropriate program of professional learning.

T2K offers just such a program. In the next section we review the skills that are required of teachers in the classroom. As we describe each skill, we list the capabilities of T2K that support that skill. This analysis provides the starting point for our review of the T2K program of professional learning.

With this background, we turn to the design of the professional learning program itself. We discuss the design principles of the program and show how that design addresses the needs of teachers as they navigate the technology-rich classroom.

Finally, we review the implementation of the professional learning program. We list the goals for participants and describe the components of the training. We conclude with a statement about the importance of training to changing teaching practice.

Developing Skillful Teachers

The Parameters of Skilled Teaching

As a preparation for our analysis, we first examine the skills that teachers need to teach in any classroom. For this analysis we rely on the careful research of Jon Saphier and Robert Gower in their seminal work, *The Skillful Teacher* (Saphier & Gower, 1997). Skilled teachers must be competent in two critical areas of classroom practice. They must manage the flow of activity of students during class; and they must design and implement a curriculum plan that is clear, comprehensive, and responsive to the needs of students.

The Skills of Classroom Management

Saphier and Gower identify six facets of classroom management: attention, momentum, time, space, routines, and discipline; and they cite educational research in support of each. Teachers must structure time and space to maximize learning. They must build routines in students, manage discipline, and maintain momentum during each lesson, while ensuring that students are attending to all that is going on. A critical element in accomplishing these various challenges is monitoring student understanding during the course of the lesson. When students lose track of an argument or misunderstand instructions, they tend to lose interest and their learning decelerates (Saphier & Gower, 1997).

As we describe each of these skills, we show how features of the T2K have been designed to address these specific skills. This analysis demonstrates how using T2K can amplify the essential skills of teaching.

Attention

Students learn only when they attend to their learning. Teachers must get students on task during class time by engaging them in legitimate curriculum activities. In fact, many researchers have documented that time on task is positively correlated with achievement (Bennett, 1978). Indeed, attention is the gatekeeper; if students are not paying attention, even an excellent lesson will be wasted.

T2K engages students through its visual demonstrations and animations. The interactive applets challenge them to explore problems and patterns. The LiveText feature scaffolds their reading skills and motivates them to keep reading. At the same time, real-time progress reports ensure that students are working on activities that are productive. Finally, all tasks and materials in T2K are relevant and engaging.

Momentum

The teacher must coordinate the flow of events during class and provide smooth, rapid transitions between activities (Kounin,1970). Breaks in momentum are a distraction and interfere with students' concentration. Waiting for activities, spending time getting started, or simply getting organized are all disruptions to classroom momentum and create boredom and disruptive behavior.

T2K helps maintain class momentum by giving the teacher tools for directing students through the transitions from group discussion to individual practice. The "Eyes to the Board" tool signals students at their laptops to stop their independent work and to participate in a large-group experience. Before the class the teacher can preview specific activities using the class planning tools. During class, when students open their laptops, their individual and small group work appears on their simplified workspace. The activities within each learning sequence are also designed to flow in a meaningful way. These aspects of the T2K design serve to maintain momentum.

Space

The teacher must organize the physical space of the classroom in order to maintain momentum and routine.

T2K and student's wireless computers provide a mechanism for organizing the physical space. Students work individually or in groups. They move to the white board in the front of the room. They can easily move their computers for each of these activities while still being monitored by the teacher's workstation.

T2K also provides tools for working with the virtual space on the computer. Student assignments are individualized and private, so students can comfortably sit side-by-side and work at different levels without the labels of "advanced" or "remedial." The Gallery provides a public space where students can share and discuss their work and their ideas.

Time

To maximize learning, teachers must manage events, regulate schedules, and allocate time appropriately. They must use that time efficiently and they must set a pace for all activities that meets the needs of individuals as well as the whole class (Stallings, 1980).

Again, the T2K planning tools help teachers use time most efficiently. By monitoring student progress on assigned work through the T2K reports, teachers can also adjust those assignments on the fly. This means that students spent every minute working at an optimal level.

Routines

Classes are managed most efficiently by building procedural routines and using them effectively. Students must know what these routines are and how to use them. The routines must be clear.

T2K helps develop these routines by deploying a uniform user interface for all activities and applets. When students open their laptops, they quickly begin to navigate their assignments, even though the activities in those assignments are completely new to them. These routines also simplify the many transitions during class.

Discipline

All teachers must respond from time to time to resistant students. Rules must be clear and specific. Positive expectations must be repeated. Students must have a sense of influence to the life of the classroom (for example, Gordon 1974).

Although T2K cannot solve all discipline problems, it can help with many of them. Students often become resistant when they are working on assignments that are too hard and they are frustrated or when their assignments are too easy and they are bored. By making all assignments to students individually and by adjusting these assignments during class, the teacher keeps students working at their optimal level.

The Skills of Curriculum Planning

Teachers must also have the background in educational theory to plan and present an effective curriculum. Saphier and Gower identify four areas of expertise: principles of learning, learning objectives, assessment, and curriculum design.

Principles of learning

Educational psychology has developed valuable insight into the basic principles of learning from the seminal works of Jerome Bruner (1977), Jean Piaget (Piaget & Inhelder, 2000) and Lev Vygotskii (1987). The influential theory of social constructivist learning builds on meaning, transfer, participation, goal setting, and guided practice. For a contemporary review see Palinscar (1998).

T2K is designed on these proven principles of learning. The constructivist design to the activities builds on students' understanding and responds to individual learners. The social construction of knowledge is enhanced through group dynamics. The development of automated skills is achieved through frequent practice with consistent, helpful feedback.

Objectives

Each lesson begins with clearly defined objectives. These state the goals of the lesson and help teacher and student keep track of where they are going.

With a thorough alignment to standards and a careful matching of activities to objectives, the T2K curriculum addresses this need fully. Specific learning objectives are identified within each learning activity and the T2K curriculum is fully aligned to state and national standards.

Learning experiences

Learning experiences are the various activities of the classroom. These experiences must be selected for variety, depth, and interest; and they must match the cognitive level of each student. The variety of ways in which students learn is well documented and this variety in learning adds to the importance of matching learning experiences to students (for one prominent theory, see Gardner 2006).

T2K provides a variety of learning experiences in various media. Multimedia presentations introduce concepts, questions, and techniques. Applets provide an open forum for exploration and discussion. Exercises and games give students ample opportunity to practice skills and work with concepts. Furthermore, many of these activities are graded for difficulty. This variety in style and level gives the teacher many opportunities to match learning experiences to the needs of individual students.

Assessment

Frequent, reliable assessment is crucial to learning. But any assessment must be tied to significant learning objectives and the criteria for success must be clear and authentic. Finally, the results must be immediately available to both teacher and student (Stiggins & Conklin 1992).

T2K offers many tools to help teachers design and administer assessments that are appropriate to their students. Teachers obtain and review the results of these assessments quickly so that they can use those results to guide and adapt instruction and practice. With the T2K system a teacher can administer an assessment, review the results, and re-assign activities to students all during the same class period.

Curriculum design

Curriculum design is the method that combines learning objectives, learning experiences, and assessment into a meaningful whole. Well-designed curriculum includes a variety of learning experiences, selected key concepts and essential questions, a well-organized structure that presents and reviews material, and an integration that lets students apply learning to new areas.

Although T2K comes with a fully formed curriculum, the materials that it contains function independently. Using the planning tools, teachers can customize the curriculum design and add their own materials to meet local goals and objectives.

These skills of classroom management and curriculum planning are required in any successful teacher. T2K can amplify those skills. But to do so, the technology must itself be used skillfully, in the service of day-to-day teaching. It is in this context that we turn now to the T2K program of professional learning.

The Design of the Professional Learning

Learning the Classroom Choreography of T2K

A classroom using T2K functions quite differently than a traditional classroom. The students have laptop computers connected to a wireless network. The teacher has a workstation connected to the network and to a projector system. At times students must attend to the presentations at the front of the room; at other times they must work independently on assignments on their laptops or in small groups on projects. They share their work with the class and they participate in discussions.

Managing these various activities and guiding students through the transitions from one activity to another requires a certain teaching choreography. Teachers must direct the large group presentations, work with individual students, observe small groups, and lead the discussions. Furthermore they must move quickly from one setting to another, without losing momentum, using the technology of T2K as an ally not a distraction.

Learning to use this technology in the demanding environment of classroom management requires training and guided practice. To help teachers achieve the necessary proficiency with the product and to adapt it to their personal teaching style, T2K has developed a thorough program of professional learning. This program builds teachers' facility with the technology and teaches them to adapt T2K and its content to their personal teaching style and to the specific needs of their students.

Design Principles of T2K Professional Learning

The program of professional learning for T2K is designed around five principles that exemplify high-quality professional development (HQPD).

1) HQPD models effective teaching.

High quality professional development should model good teaching and learning practice. A report from the National Science Foundation finds that “the constructivist theories of learning that underlie school mathematics reform should be applied to structuring teachers' learning as well (NSF 2000, p. 30).” Therefore a constructivist approach is taken to adult learning in this program. Teachers explore concepts, discussion what they are learning, and apply that to their teaching practice.

Also, the learning of professional development must be anchored in the real world. “Design an authentic task. Give the learner ownership of the process used to develop a solution. Design the learning environment to support and challenge the learner's thinking. Encourage testing ideas against alternative views. Provide the opportunity for reflection on the content learned and the learning process (Savery & Duffy 2001, pp. 4-5).”

The T2K professional learning program achieves this with role-playing exercises that simulate the classroom, practice teaching with small groups of students, and finally actual classroom teaching using T2K under the watchful eye of an instructional coach. In each of these experiences, participants can practice with the skills they need, but they also observe the use of these pedagogical approaches in the training itself.

The program also models effective teaching in another way. The content of T2K consists of units of instruction that have been broken into guided learning sequences of activities. Any teacher who follows these guided sequences will provide a well-designed set of activities for students. The content is designed to encourage skilled teaching and this scaffolding will be most important to new teachers. Furthermore, during the school year the instructional coach suggests additional models of effective practice.

2) HQPD connects to classroom practice and student work.

Secondly, high quality professional development improves classroom practice by providing opportunities for teachers to apply strategies, explore resources, and implement authentic activities in the classroom during the course. As with all adult learning, professional development must be relevant to the participants' practice by encouraging participants to take what they are learning back to their classrooms and then to discuss their classroom experiences with colleagues.

This makes the content of professional development relevant to the day-to-day activities of the classroom and also provides concrete examples and connections for the participants (Sutton & Krueger 2002; Imel 1989). "Professional development opportunities for teachers need to occur in a context in which teachers can try what they have learned in their classrooms (NCTM 2003, p. 49)."

The focus on classroom practice and student work accomplishes two things. First, it provides a tangible, real-world setting for the training. Second, it encourages repeated efforts to use the materials and to practice with the technology. This is related to the idea of the choreography of the classroom. Learning to use the computer in a training session is just the beginning; teachers must also learn to use it in the classroom with its many demands and distractions.

T2K maintains a close connection to actual classroom practice through role-playing, guided practice, and classroom observation. Keeping the training concrete in this way keeps the teachers from focusing too heavily on the technology itself. Ultimately, this program of professional learning is promoting a significant change in pedagogy, and that change could be easily derailed by needless attention paid to more superficial aspects of the technology.

3) HQPD attends to the content standards.

High quality professional development links content to local and national standards, providing a consistent and coherent framework for change. The connection between professional development and educational standards ensures the continuity between classroom practice, curricula, materials, and assessment practices.

The National Council of Teachers of Mathematics (NCTM) was the first group to formulate sets of standards, issuing standards for curriculum and evaluation in 1989. The NCTM *Standards* documents were well received and influenced subsequent efforts at settings standards in other school subjects (NCTM 2003). Today, 49 states have developed content standards in mathematics for most grades and many of these accompany their standards with high-stakes tests that are aligned to the standards (NRC 2001).

T2K is fully aligned with state and national standards. Each segment in the guided learning sequences is fully defined in terms of learning objectives and alignments. As participants review the content of the units of T2K, they work through these various standards and objectives. Also, the attention paid to standards, like the focus on classroom practice, reminds participants of the practicality of the T2K product, rather than on its challenges or novelty.

4) HQPD fosters reflective teaching practice.

Reflection helps teachers grow from their own experiences. It helps them understand the process of their own learning, solidify areas of strength and determine areas for growth.

Indeed, change occurs only through a reflection on one's practice. Since the publication of Donald Schon's books *The Reflective Practitioner* (Schon 1983) and *Educating the Reflective Practitioner* (Schon 1987), we have come to understand that teachers need the time for reflection and that this skill must be carefully taught in any professional development program. Darling-Hammond writes, "Teacher need to be able to analyze and reflect on their practice, to assess the effects of their teaching, and to refine and improve their instruction. They must continuously evaluate what students are thinking and understanding and reshape their plans to take account of what they have discovered (Darling-Hammond 1997, p.2)."

T2K professional learning includes ample opportunities for discussion and reflection, especially as teachers implement the T2K program in their classrooms during the school year. These reflections form the basis for discussions during training sessions.

5) HQPD establishes a learning community.

Finally, high-quality professional development is not conducted in isolation. Instead, participants form a learning community that focuses on systemic change. Professional development must be designed so that it creates this community of practice because "when professional development is embedded in a strong community of practice focused

on instructional improvement, that community owns a stake in the outcome (Schlager & Fusco 2003, p. 121).”

In the T2K program, teachers always work in small teams; they practice teaching with each other and help one another with suggestions. During the school year, teachers meet in subject area teams in which they discuss their practice, share student work, and develop strategies for implementing constructivist pedagogy. These teams also consider ways in which the T2K product brings about improvements in teaching.

Implementation of the Professional Learning

Goals for Participants

With these design principles in mind, we turn now to the actual implementation of the program. T2K professional learning has five goals for all participants.

- 1) Establish an understanding of T2K technology and content. Teachers must fully understand both the technology and the content to work with the program effectively
- 2) Reinforce a constructivist pedagogy. The design of T2K is constructivist but teachers must practice with this pedagogy to deploy it effectively. The T2K program also helps teachers personalize their teaching, by finding the best fit between learning theory and their personal teaching style.
- 3) Build skills with collaborative learning. A related pedagogical skill is managing student working in small groups. Again, T2K facilitates this technically but teachers must practice with it to use these techniques successfully.
- 4) Develop strategies for individualizing instruction. One strength of the T2K program is its ability to provide individualized instruction during a regular class. Again, teachers must use the capabilities of the technology to reach individual students and this takes practice and reflection to master.
- 5) Establish a reflective teaching practice. Finally, the T2K program of professional learning encourages teachers to build a reflective practice. Teachers write reflections during the school year and use these in their monthly meetings of their subject-area team.

These goals are addressed in a two-phase program of professional learning.

Phase One: Initial Workshops

In the workshops of Phase One, teachers study the program and its content and role-play teaching a class using the software. They observe other teachers in classrooms and they meet regularly to discuss their observations and reflections. These initial workshops focus on using the T2K technology and on mastering the curriculum content.

Technology: Mastering the tools of T2K

The workshops help teachers develop a basic competence with the T2K technology. Teachers examine the functions of the management system that is used in the classroom; and they practice with the planning and assignment functions that are a major component of T2K. Teachers also develop lessons using the technology and they try these out with other workshop participants. The T2K online training system, described below, supplements these workshops by providing the opportunity for teachers to obtain additional technology training any time they need it. Finally, teachers have access to the T2K system from home at any time of the day.

Curriculum: Mastering the content of T2K

As teachers work with the technology, they also explore the content and structure of each of the guided learning sequences. They review the basic pedagogical concepts behind the design of T2K. They examine the scope and sequence for the entire year. They explore the way each subject area addresses key concepts and presents the essential skills.

The teachers develop sample lesson plans and discuss these with their colleagues. They discuss how they might blend the T2K materials with off-line materials and strategies that they typically use in their classroom practice. They debate various instructional methods and devise solutions to common teaching challenges. Finally, they practice putting the technology together with the content, learning how to choreograph a classroom in which each student has a wireless laptop computer.

Phase Two: Classroom Teaching with Observation

During the school year that follows the initial workshops, teachers use T2K in their classrooms with their students. In this second phase of the professional learning, an instructional coach observes them regularly in their classes. They also meet with a discipline team and the coach. They discuss classroom experiences, share curriculum units that they have developed, plan lessons together, and write reflections on their experiences.

Classroom management: Choreography

Teachers must learn to manage the group of students who are working with laptops. For example, teachers may find that standing in the back of the classroom, behind the students, gives them a view of many laptop screens at once. By scanning the room they can get a quick perspective on whether individual students are engaged in the activities. Teachers also receive alerts on student progress at their computer.

In observing a class session, the instructional coach focuses especially on the teachers' choreography, noting how they manage the transition periods, as students go from a whole-group presentation to individual and small-group work. The coach also discusses the ways of combining the T2K content with off-line teaching materials that fit with the lesson in a blended format.

Individualization: Assignments and assessment

The in-class sessions examine the use of the assignments and assessments, as teachers learn to make best use of the tools in T2K for individualizing instruction. Teachers analyze their use of the individual assignments and assessments to see if these generally are the best fit with each student's capabilities. They practice using the reporting system to measure progress and they try their hand at revising assignments during class sessions.

Pedagogy: Developing a constructivist approach

Finally, close attention is paid to how the teacher adapts the principles of a constructivist pedagogy to regular teaching practice. This includes specific instructional strategies as well as the consideration of other teaching materials in the classroom that can be blended with T2K.

As teachers try out these various ideas with their students, they gather samples of student work from the classroom to share with their colleagues in discussion groups. The instructional coach observes selected classes and adds feedback to the teacher's impressions. The goal throughout the T2K professional learning is to help teachers learn how best to use the software in a way that reflects their personal teaching style.

Virtual Support System

Along with the face-to-face professional learning services, T2K also provides teachers with a Web-based Virtual Support System (VSS) that includes all product and course documentation, answers specific product questions, provides a setting for practicing with the T2K tools, and establishes a forum for the community of users to share knowledge and grow together.

Teachers use the VSS to find answers to their questions quickly. These answers come in different forms – text answers to FAQs, short video tutorials on key elements, and on-line versions of all user manuals. When a teacher does not find an answer online, the VSS provides access to the T2K support center for a personal answer to the question.

Finally, the VSS establishes a user forum for teachers to express their needs, thoughts and experiences. This area helps participants feel that they are part of a community of learners and creates a supporting environment for growth and change.

Concluding Remarks

The T2K platform and its companion program of professional learning provide a stimulus for a transformation in classroom practice. This stimulus derives from the artful combination of the three elements – the technology, the pedagogy, and skilled teaching. The T2K program of professional learning is designed to generate this stimulus by bringing these three factors together in the classroom.

Nevertheless, such a transformation can be challenging to practitioners. The program of professional learning analyzed in this paper addresses the challenges inherent in this transformation as it guides teachers through the transition.

This program supports the successful implementation of the innovative T2K platform and in so doing it provides an opportunity for schools to realize the long-term benefits of technology, curriculum, and reinvigorated professional practice.

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