WHITE PAPER AND RESEARCH

LEARNING VILLAGE

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LEARNING TECHNOLOGY

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The Learning Village application is a suite of tools developed by IBM and to address the needs of schools as they strive to establish themselves as professional learning communities and as they accept the challenge of No Child Left Behind. Learning Village is built on sound educational research and honed through years of field-testing in schools. This white paper describes the technology and the educational research that formed its design. It also reviews the empirical evidence of Learning Village's effectiveness and considers the utility of these tools in creating high quality education.

Schools that are dedicated to quality possess a number of distinct features. They are committed to a process of steady improvement. They pursue their goals by regularly identifying new curriculum and pedagogy and by disseminating best teaching practices. They consistently upgrade the skills and knowledge of their teachers and they structure themselves as learning communities. In schools like these, expertise, knowledge and learning are pursued vigorously by all members of the community, adults and students alike.

This paper refers to schools with these features as "dynamic schools."

Declaring its goals

The dynamic school develops a single statement of its educational goals and it sets precise objectives for student learning. These goal statements are public and readily available to all administrators, teachers, parents and students. All of the activities in the school are designed to advance learning toward these goals. As new materials are developed — lessons, resources, and even teacher training—those developments are aligned with the goals.

Striving to improve

In the dynamic school, the work of teachers is a craft that must be constantly adjusted, coordinated and improved. That effort involves teacher professional development, group research, study, and the sharing of "best practice" lessons.

Establishing a learning community

Structuring itself as a learning community, the dynamic school creates a social culture in which all activities focus on continually improving the practice of the members to make the entire system more effective. In this community,learning is a social enterprise that draws on the expertise of the membership, nurtures novices to the profession, and engages all participants in decision-making. This community structure addresses the needs of its members and "stimulates them in their learning trajectory" (Barab, S., et al. 2004).

The dynamic school faces many challenges as it pursues these goals. This paper explores the educational benefits of this pursuit and identifies the technology-based tools that can assist in those efforts. The paper concludes with an opinion about the potential of this technology to make a genuine difference in schools.

II. Research Supporting the Design

This review of the educational research literature considers each of the three principles of the dynamic school – setting learning goals, striving to improve, and establishing a learning community. For each of these qualities, the paper reviews the research behind the quality and then describes how that quality is implemented in Learning Village.

A. Setting Learning Goals with a Curriculum Map

The dynamic school develops a coherent statement of its goals in terms of objectives for student learning. These objectives are public and readily available to all administrators, teachers, and parents. Once the goals have been identified, they must be carefully aligned to teaching methods in the curriculum. The combination of goals and methods for achieving them is called the curriculum map for the school. The curriculum map brings together, in a single place, all of the related aspects of teaching and learning in all schools in the district and they give teachers and administrators a picture of how they teach, what resources they have to work with, and how these efforts can be reflected in student achievement. Research demonstrates the importance of these documents to teaching and learning and suggests ways they can be organized and deployed.

The Findings

Research finds that establishing clear statements of learning goals and aligning curriculum to them is important to effective education. Those goals must also be well organized and technology can be used both to display and to implement them efficiently.

The importance of goal statements

Setting goals and aligning curriculum are crucial starting points. Teachers must have a clear sense of what students are to learn.

A logical starting point for planners is to gain a clear picture of who the students in the system are, what standards are in place for them, and how they are performing in relation to those standards (Loucks-Horsley, et al. 2003).

Organizing these statements into a coherent and usable curriculum map is the next step in goal setting. This structure lays out learning goals for all grades and subjects in a chronological order. The result must be understandable, and developing that map involves the entire faculty.

Curriculum mapping facilitates conversations about how to change the curriculum to meet particular challenges. It provides answers to critical questions about student performance (NCREL 2003).

Most importantly, mapping has always been a remarkable tool for communication among teachers as they peruse both vertical and horizontal perspectives on curriculum and assessment, between administrators and staff as standards are aligned with real

practice, and for any new teacher arriving in a school who needs to see the archive of past curricular experience (Jacobs 2003).

The need for organization of goals

The curriculum map is a complex and often unwieldy document.

The complexity and abstractness of some curriculum maps limit the degree to which they direct what actually gets taught. Teachers, therefore, need guidance about how to align what they teach with what the district or state requires of them. And to do that, they need to know what they teach (NCREL 2003).

That said, researchers have found that an online version of a curriculum map can be quite effective, when it is embedded in a sophisticated database technology with a thoughtful interface design.

The purpose of curriculum mapping has always been to improve student performance, but now that technology can provide a hub that links all the components of curriculum, assessment, and instruction in the schools, those connections can be strengthened and better analyzed to build student learning over time (Jacobs 2003).

The impact of goals on learning

Finally, and perhaps most importantly, research shows clearly that the development of a curriculum map by a school, one that is fully aligned to learning standards and is used consistently throughout the school, has a direct and measurable effect on student learning.

Improving the alignment of classroom instruction to district benchmarks and state standards can dramatically improve the quality—and equity—of education (NCREL 2003).

One major meta-analysis of an international literature base of research studies found that simply articulating a curriculum and ensuring it was taught did raise student test scores, but only modestly - by 7 percentile points, on average. However, when curriculum is well-articulated, aligned to assessments, and school leaders monitor the extent to which it is actually covered, the measurable impact - or effect size - of such strategies is 31 percentile points in student achievement (MCREL 2000).

Marzano identifies a number of factors that are related to increased student achievement. These include the use of effective goal statements and curriculum maps. The conclusions presented imply that student achievement can be strongly affected if schools provide teachers with a well-articulated curriculum that specifically addresses the content on the assessments that are used to judge the academic achievement of students and ensure that the articulated curriculum is actually taught; (and they) establish specific achievement goals for students and carefully monitor the extent to which those goals are being met (Marzano 2000).

In their analysis of effective schools in Ohio, Kerchevak and Newbill found the same thing.

Participants identified curriculum alignment as the single greatest factor in achieving improved test results. These findings are supported by the effective schools research literature that notes the importance of curriculum aligned to proficiency standards across all subject areas and grade levels, the frequent use of standardized assessments to monitor student progress, and clear instructional objectives (Kerchevak & Newbill 2000).

Moreover, there is evidence that developing and using a curriculum map supports the establishment of the learning community element of the dynamic school as well.

A long-term commitment to mapping can come only by infusing the process into the culture of the school. Commitment is developed when teachers understand the workings and the value of the process (Mills 2003).

Curriculum Mapping: The Learning Village Solution

Developing a curriculum map is clearly an important accomplishment for a school, but working with the resulting product presents a new challenge. Printed on paper, a curriculum map will be several thousand pages long and it will in turn refer to thousands of tests, workbooks, videos, lab materials, professional development workshops, and so on. The challenge facing the district is how to keep this information up to date and how to get it into teachers' hands so it can be put to use.

Putting the curriculum map online

The Learning Village application puts curriculum mapping at the very center of its array of online tools and services. Using a Web-based environment, the Learning Village curriculum map, called the Instructional Organizer, contains all the information in the curriculum and its associated links, including descriptions of benchmarks of student performance, references to the resources for teaching and assessment, and ties to professional development opportunities.

The Learning Village curriculum map lists all print materials in the curriculum, as well as manipulatives, multimedia resources, computer programs, and Web resources. To build the curriculum map in Learning Village, the school's curriculum specialists analyze all the available information for a particular subject and grade and then assemble that information into units that span extended topics or themes. They also break it up into shorter lessons that describe precisely how to approach a particular skill and where to find all the relevant resources. Both the larger, thematic units and the specific lessons are linked to associated standards for learning.

Classroom teachers and administrators can display the units and lessons as a traditional scope and sequence that lists them in a specific order and associates them with a date in the school year. They can print any portion of the list, add or revise lessons, and add

references to their own materials. Because this list is interactive, from each unit or lesson they can also see all related student benchmarks, assessments, resource links and appropriate professional development.

Access to resources

The Learning Village curriculum map transforms the static statement of goals and methods into a dynamic tool that puts at the teachers' fingertips all of the resources available on a particular topic. Online resources are instantly accessed or downloaded; print materials, manipulatives, media, and lab equipment are cross-referenced with instructions, lessons, and assessments. Even relevant professional development opportunities are tied into the lessons and units. By including these resources, the curriculum map becomes the operational center of the curriculum and that ensures that it will be used.

Learning Village also provides the school district with the technology to build a portal to all of its applications and content. Using a single point of entry and logon procedure, everyone in the district -- teachers and administrators as well as parents and students— can gain direct access to these resources.

Display and search features

A second feature of the Learning Village curriculum map is the variety of search functions. After all, the units and lessons in the curriculum map are valuable only if the teachers and administrators can find what they want when they need it. Lists of units, organized by the school calendar as a scope and sequence, is one way to display the results.

But there are two other very different search mechanisms:

> HORIZONTAL SEARCH – Teachers or administrators quickly find all units (or lessons) related to particular subject, grade, benchmark or student skill. As an example, this horizontal search for the terms "math" in "sixth grade" might produce a list of 12 units or 100 lessons that cover the entire 6th grade math curriculum.

> VERTICAL SEARCH – Teachers and administrators can also search for concepts or keywords to find all the places, throughout the K-12 curriculum, that treat one concept. For example, the keyword "median" might produce a list of lessons from 3rd grade as the concept is first introduced, from 5th grade as it is amplified, and from 7th grade when it is evaluated on the State test.

These different kinds of search through the spiraling curriculum make the Learning Village curriculum map an extremely powerful tool. Finding these connections across the curriculum without an interactive technology is extremely difficult, and perhaps impossible.

Updates and distribution

Finally, the curriculum map must be distributed to all educators throughout the district. Because it is a Web-based technology, this distribution is straightforward. Also, the curriculum map must be updated easily and frequently as new materials are developed. Because it is housed in a database, these updates can be made quickly and the results instantly disseminated throughout the district.

B. Continuous Improvement through Professional Development

A second feature of the dynamic school is its desire for constant improvement. Developing and revising the goal statements of the curriculum map is one manifestations of this desire. Another is the use of continuing professional development. When teachers change grades or courses they once taught, or when new teaching methods are revealed by research, or when new curriculum materials and technologies become available, related professional development experiences become crucial, even for the most experienced teachers.

The Findings

Research indicates that there are several design features that are commonly associated with effective professional development to achieve sustained results. It should be tied directly to classroom practice. It must be delivered in a flexible fashion, in terms of timing as well as content. And it must address both the content of the subject matter as well as the pedagogy. The dynamic school seeks out professional development programs that embody these features.

Linking professional development to classroom practice

Teachers need to try out in their classrooms what they are learning in their professional development classes.

A growing consensus about effective professional development is that it is most powerful when embedded in the daily work life of teachers to create a collaborative culture of inquiry about student understanding (Sutton & Krueger 2002; see also, Schifter 1998; Mewborn 2003).

This approach turns the professional development into a "practice-based" experience (Hawley & Valli 2000). Discussion of teachers' experiences in the classroom "engages participants in a critical reflection on practice" and provides a natural entry point for guidance from an expert (NSF 2000). A result is greater likelihood that teachers will use what they have learned in their classrooms (Loucks-Horsley, et al. 2003).

The importance of examining student work

A second aspect of effective professional development is the examination of student work as part of the training. Research has found that this too leads to improved practice and sustained change.

In successful programs (of professional development) that focus on mathematics and children's thinking, teachers look at problem-solving strategies of real students, artifacts of student work, cases of real classrooms and the like (NRC 2001).

Addressing mastery of content, pedagogy, and technology

Content knowledge is critical to successful teaching and teachers must understand how to teach that content.

Professional development tailored to increase teacher repertories of classroom instructional practices—coupled with knowledge of mathematical content—increases student academic performance (Sutton & Krueger 2003).

Furthermore, teachers must be able to combine their understanding of the content and their grasp of pedagogy. Again, in mathematics, "Gearhart et al. (1999) found that professional development that was primarily aimed at providing collegial support without a concomitant focus on mathematics, children's mathematical thinking, or curriculum, was not as effective in helping teachers change their practices as professional development with an explicit focus on these topics" (Mewborn 2003).

Delivering a flexible program online

Any system of professional development must be flexible and adaptable. Teachers have many different learning needs at different times.

There is no prescription for which designs are right for which situations. Skilled planners have one foot planted firmly in theory (knowledge and beliefs and vision) and the other in reality (Loucks-Horsley et al. 2003).

Effective professional development experiences respond to this variety of requirements with flexibility in both content and delivery. Putting that training online creates a system with flexibility. If a teacher wants assistance developing a rubric, she does not have to sit through an entire course of performance assessment to receive it. She can zero in to the course module, exemplars, samples or guidelines that meet her learning needs... (When) learners can easily tailor their own learning to align with their professional learning goals, (they gain) a sense of control over their own learning (NSDC 2001).

Professional Development: The Learning Village Solution

The Learning Village application provides the structure and technology that addresses these design features of effective professional development. It associates each of the professional development resources of the district with corresponding lessons and units in the curriculum map. It makes these easily accessible to all teachers when they need them. And it emphasizes the connection between the concepts of the training and the teacher's classroom practice and student work.

Just-in-time professional development

Many programs of professional development are delivered to teachers online. These programs benefit from the flexible delivery that these forms of study allow. Learning

Village takes this flexibility one step further. It includes links to the professional development resources in the curriculum map itself. That means that when teachers review a lesson or unit for use in their classrooms, they find the related professional development opportunities at the same time. This lets them select and then follow through on particular training experiences at the precise moment when they need them. It lets the teachers decide, "just in time," what they need to learn and when. It lets them skip the things that they already understand and postpone the study of the things they will need to learn about later.

The Learning Village portal solution also simplifies access to the online professional development opportunities. After logging in through Learning Village, teachers are automatically logged into any online course to which they belong. This integration of services ensures a ready connection among teaching practices, the school's curriculum map and related resources, and teachers' individual efforts at professional development.

Classroom practice and student work

By embedding professional development links in the curriculum map, Learning Village achieves a second advantage of effective professional development. Teachers follow through on a training module as they are using that concept in their classrooms. That means that they will try out the concepts with their students and will have an opportunity to use those classroom experiences as a part of their professional study.

C. Building a Learning Community

The dynamic school structures itself as a "learning community" in which learning is a social activity. This applies to the teachers and administrators as well as to the students in the school. The learning community, by addressing the changing needs of its members, amplifies the goals and constant improvement endeavors of the dynamic school.

The Findings

Research has defined the characteristics of learning communities and has examined how online tools function to enable these qualities.

Defining the learning community

A learning community is "a persistent, sustained social network of individuals who share and develop an overlapping knowledge base, set of beliefs, values, history and experiences focused on a common practice and/or mutual enterprise" (Barab, S., et al. 2004).

In a community of this sort, with its focus on activity or practice, learning is viewed as "increased participation and responsibility in activity and a view of knowledge (becomes) knowledge-in-use… Successful communities grow their collective knowledge-in-use, or 'practice,' by incorporating variations or responding to contradictions that arise from the diversity of their dynamic membership and their collective interaction with their larger communities" (Reil & Polin 2004).

Reil and Polin identify knowledge and learning in two kinds of activity. One is codified in policies, documents and discussion and provides the community with "stable but brittle knowledge base." The other is experiential or lived knowledge, embodied in the practices of the members. Both are critical to the health of the community (Reil & Polin 2004).

Finally, the environment of the learning community and the tools that support it are critical to effective learning within that organization.

The importance of learning communities, where ideas are discussed and understanding enriched, is critical to the design of an effective learning environment. The use of collaborative learning groups provides one strategy.... (supporting) collaboration by linking learners over electronic communications networks as the work on a common task is an alternative framework (Savery & Duffy 2001).

Online tools that enable the learning community

Well-designed online tools have enormous potential to develop and support an organization structured as a learning community.

Technology has provided the hub that links pertinent data from individual learners not only to the school but also to the district, the country, and the world. As educators draw on these connections to focus their teaching, they should begin to see improved performances in their students' learning and achievement... Well-designed software should allow teachers to plan collaboratively over the Internet—any time, any place; identify the best lessons, units, and assessments; take note of what precedes and follows any given course of study; and find collaborative partners and share assessments through a sophisticated search function (Jacobs 2003).

Networked information technologies also support and sustain teachers in learning communities... The value of these communities is particularly strong for new teachers, who often face difficulties in finding the support they need in their local schools. By participating in networked learning communities, they are able to share and expand their expertise through regular interactions with their colleagues and other leaders in the profession (NCTAF 2003).

Finally, the tools of the online environment have the potential to enhance the community-building aspects of the dynamic school. It "expands access to information, networks, people and ideas; it increases the flexibility of time and places for learning; and it provides significant resources" (NSDC 2001).

Although online technology can break down walls and bring teachers together in many ways, this alone is no guarantee of success. The use of technology must be designed to create an online community that has a stake in the outcome (Schlager & Fusco 2003).

The goal then is "to create an online community of learners in which participants share information and learn from each other. Educators value the opportunity to interact with knowledgeable peers who face the same issues and can provide both new ideas and

feedback about one's own ideas and practices" (Kleiman, et al. 2000).

Building a Community: The Learning Village Solution

The tools in Learning Village, when aligned to goals and professional development opportunities, provide the platform for a practice-based learning community. The jurying process for sharing "best practices" among teachers, together with the threaded discussions associated with activities and resources, amplify these community-building efforts.

Sharing best practices

With Learning Village, teachers can add their own lessons that teach a particular concept or skill particularly well. These teacher-authored lessons are aligned to the standards of student performance, linked to resources in the school, and placed in the thematic units that structure the overall curriculum. Of course, local authorship of content in the curriculum map raises issues of quality and consistency. Learning Village coordinates quality control by providing tools for jurying the new lessons; candidate lessons are reviewed by peers and edited as needed before they are disseminated across the district. In this way the district codifies, evaluates and disseminates the very best lessons and curriculum ideas from its teaching ranks and in so doing it expands and publicizes its intellectual capital.

Communication tools

Teachers and administrators can create original units, lessons, activities and resources in Learning Village. As they write and revise these materials, they use Learning Village tools for communication and collaboration.

For instance, threaded discussions about new units and lessons support real-time interactions about classroom practice and student experience. Editing and reviewing establish a high level of quality in the development of these materials. When teachers create a new lesson, they select colleagues as their editors, individuals who can make changes to the lesson. Later, reviewers comment of the specifics of the materials and the author revises accordingly. Ultimately, the reviewers have the power to decide which materials will be shared with the school community.

The communications tools of Learning Village support these roles of discussion, editing, and reviewing. They maintain a high level of quality and nurture the school as a learning community. Learning Village can also expand to a wider community, as districts collaborate and share their resources with one another. When that happens, the learning community expands as well.

D. The Dynamic School Revisited

In summary, the Learning Village curriculum map is an interactive system that provides both consistency and a unified sense of purpose within a changing educational system. This technology addresses the three requirements of the dynamic school described earlier.

> SETTING GOALS: The Learning Village curriculum map gives a school a mechanism for tying all of its educational efforts to its stated goals. It links all aspects of the curriculum, from units to lessons to activities and resources, to the high-stakes standards and associated assessments of the district or state.

> Constant Improvement: The units and lessons of the Learning Village curriculum map are also linked to related professional development opportunities. Teachers can learn the skills they need to improve their teaching precisely at the moment that they need those skills.

> Community of Practice: As an online environment, the Learning Village curriculum map is easily updated and disseminated. More importantly, this mechanism for sharing resources, teaching ideas and professional development, together with the associated tools for communication and jurying, creates a practice-based learning community.

The design of Learning Village is based on sound educational research and throughout its development it has been thoroughly tested in schools. Learning Village has also been formally evaluated by an independent research organization. This section recounts the development history of Learning Village and summarizes the findings of that independent evaluation.

III. Evaluation of Learning Village

A. Development Background

Learning Village was developed through a major philanthropic initiative by IBM called Reinventing Education. Begun in 1994, this public-private partnership "was designed to raise the quality of teaching and learning for all children by tending to systemic problems both at their roots and over time" (CCT 2004). From the beginning the project cultivated development partnerships with urban schools and state departments of education and carefully shared the developments and accomplishments in one location with other participating organizations.

The Center for Children and Technology (CCT), a division of the Education Development Center, has conducted an independent evaluation of the Reinventing Education initiative.

That evaluation identified a number of accomplishments of this 10-year effort. These include the collection of "best practice" models of school change, technology tools that improve education, measured improvement in student learning, new programs for teacher development, and a national school reform effort (CCT 2004).

The CCT research credited the success of this initiative to IBM's sustained commitment to the effort. The company demonstrated the priority it placed on raising the quality of public

education by providing expert talent to the initiative. It recruited and paid the salaries of full-time IBM employees from its research laboratories and consulting organizations to work elbow-to-elbow with educators in the classrooms. The initiative was not an extracurricular activity, but an actual work assignment (CCT 2004). In 2003, developed a partnership with IBM to upgrade the core technology of the IBM Learning Village application, to expand it to a portal solution, and to create large-scale development partnerships with key school districts. One such partnership with the Broward County Public Schools in Florida is described in the case study, "Partnership for High-Quality Education in Broward County."

B. Empirical Verification of Effectiveness

In its evaluation of Reinventing Education, CCT conducted a series of empirical studies of student performance in schools in West Virginia that were using IBM Learning Village. The first study was conducted during the 1999-2000 school year with teachers who had used Learning Village to create and review lesson plans and units. CCT analyzed the test scores of students in those classes and drew the following conclusion.

Our analysis of results from state standardized tests indicated that use of lesson units created through the Reinventing Education project helps students who are underperforming make substantial gains in a relatively short period of time (within a single school year). For students already performing above the average, use of these lesson units maintains their performance lead. This study demonstrates these results across grade levels and across curriculum areas (Spielvogel, et al. 2001).

This initial empirical study was extended using a similar methodology a year later and reported in CCT's final evaluation of Reinventing Education. Again students in classes taught by teachers using IBM Learning Village were compared to a random sample of students across the school district from teachers who did not use it. They found that this initiative was successful in supporting teachers with their professional goals and action plans, in fostering system-wide change and in integrating technology into the classroom. Again, student test scores demonstrated a measurable increase.

When Learning Village applications were targeted to specific instructional objectives, results were substantial as evidenced by the West Virginia students who outperformed their peers in every test category on the Stanford 9 tests in successive years (CCT 2004).

Researchers at CCT concluded that these results demonstrate that "technology investment coupled with professional development and careful program planning can result in significant gains in student achievement. An analysis of student test scores at two case study schools in West Virginia over three years indicates a relationship between high use of a Learning Village lesson and an increase in student outcomes measured by Stanford Achievement Test – Nine (Stanford 9) test scores" (CCT 2004).

The results of these empirical studies are summarized on the following table.

Table 1. Means and Standard Deviations of West Virginia Standardized Test Scores for one school cohort

	YEAR 2000		YEAR 2001		YEAR 2002		
	GRADE 3		GRADE 4		GRADE 5		
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	
Reading Total							
School	625.04	(44.45)	650.09	(41.57)	671.18	(38.31)	68
County	623.68	(33.15)	650.75	(32.88)	659.02	(36.40)	44
Language Total							
School	629.74	(43.80)	660.19	(46.75)	661.16	(39.52)	68
County	611.45	(33.45)	643.66	(37.15)	638.91	(34.68)	44
Spelling Total							
School	628.63	(55.78)	643.85	(41.13)	656.90	(49.35)	68
County	610.52	(39.63)	642.84	(38.45)	646.34	(31.57)	44
Listening Total							
School	629.67	(29.31)	662.37	(41.35)	672.55	(38.52)	67
County	632.55	(25.04)	659.20	(36.47)	656.84	(29.88)	44
Social Studies Total							
School	617.96	(39.49)	631.66	(34.62)	641.97	(35.23)	67
County	597.82	(31.86)	629.99	(33.84)	619.75	(30.58)	44
Science Total							
School	*632.88	(39.38)	663.66	(36.75)	662.52	(34.38)	67
County	620.61	(33.61)	649.32	(27.34)	649.59	(29.46)	44

The school group consists of all students in all classes where teachers used Instructional Planner juried lessons extensively starting in Year 2001 and continuing in Year 2002. The students in the County sample are selected randomly from the total population of students taking the SAT 9 that year. School and County represent same SES factors. Note that the two populations have no significant differences in all but one area (science) until Year 2002 after the use of IP lessons.

Significant mean differences between school and county samples appear in bold. *Students in the School sample for science scored significantly higher ($p < .05$) than students in the County sample across all three years (CCT 2004).

The Learning Village application is built from a sophisticated cluster of contemporary technologies. This section reviews the architectural underpinnings of these tools.

A. Components

Learning Village is a suite of tools for teachers and administrators that is configured as a district-wide portal. Its middleware, database and web programming languages provide interactive links to other third-party applications. The portal also provides the district with a single password system for all of its online educational applications. All teachers, administrators, students, and parents own one sign-on account and using the Learning Village application as an entry, they can sign on to any of these third-party applications.

The Learning Village application may include a district-wide teacher license to curriculum products in core subject areas, in direct support of the curriculum mapping activities. That is, all units and lessons that the district creates in Learning Village can include interactive links to related curriculum products. The following resources, included in the suite of applications, will provide additional content for Learning Village:

State standards. The Learning Village system is populated with state standards and benchmarks. Learning Village will also include any local standards provided by a district.

Lesson Plans will provide a set of lesson plans to curriculum when appropriate.

Collaborations with other districts and states. Using Learning Village as a communication and data sharing tool, the district can participate in a network of districts who are sharing lesson plans, activities and other valuable resources.

Project support. All tasks involved with project planning, management, implementation, training, product configuration, and customization are included. This work will create access to an inventory of support documentation for all participants.

B. Platforms and Languages

Learning Village is constructed using state-of-the-art middleware and database technology and utilizes familiar web programming languages. Middleware is software that mediates or translates between an application program (like Learning Village) and a network (such as a district in-house network). It manages the interaction between disparate applications across heterogeneous computing platforms (like the communication between Learning Village and Blackboard).

Learning Village is built on IBM's WebSphere and DB2 middleware platform. Web Services are constructed in Java and Java Beans technology. The Presentation Layer is written in Java and controlled by the implementation of Java Beans. The result is a highly dynamic system that reflects the design of each school district's requirements. For a more complete description of the technology behind Learning Village, see the document, Learning Village:

V. Addressing the mandates of NCLB

With the passage of the No Child Left Behind Act (NCLB 2002), the Bush administration launched a major initiative to improve education that focused on increased accountability for state departments of education and local schools; greater choice for parents; more flexibility for educational agencies at all levels in their use of Federal dollars; and an emphasis on reading.

The law is commonly summarized in terms of its "Four Pillars." The Learning Village application can be seen as an enabling technology that addresses each of these four components of the law.

Stronger Accountability for Results

Under No Child Left Behind, states are working to close the achievement gap and make sure all students achieve academic proficiency. Annual state and school district report cards inform parents and communities about state and school progress (NCLB 2002).

Although the law focuses on measuring progress of schools, the work that schools actually do precedes these measurements and must ultimately have an impact on them. All aspects of Learning Village in its approach to creating the dynamic school address student achievement.

Proven Education Methods

No Child Left Behind puts emphasis on determining which educational programs and practices have been proven effective through rigorous scientific research. Federal funding is targeted to support these programs and teaching methods that work to improve student learning and achievement (NCLB 2002).

Again the NCLB legislation emphasizes the use of proven materials. The Learning Village application takes this goal one step further and provides the tools that teachers need to identify these materials in a timely fashion, align them to learning goals, tie them into their lessons and assessments, and help them find the support and training they may need to use these materials effectively.

More Choices for Parents

Parents of children in low-performing schools have new options under No Child Left Behind. In schools that do not meet state standards for at least two consecutive years, parents may transfer their children to a better-performing public school (NCLB 2002).

The Learning Village application, as an online portal, includes ready access to many materials for parents. This draws them into the educational content in their schools and gives them a means for communicating with teachers and administrators.

This parental choice component of NCLB also gives parents some options for transferring their children. In this contentious environment, it is more important than ever for public schools to open their doors and make more visible the good work they are accomplishing. Reaching out in this way is a crucial strategy for schools, given that the high-stakes measures of achievement are often extremely limited in what they measure and yield results that are difficult to interpret wisely. The law also encourages schools to use technology to support parental involvement in just this way.

More Freedom for States and Communities

States and school districts have unprecedented flexibility in how they use federal education funds. This allows districts to use funds for their particular needs, such as hiring new teachers... and improving teacher training and professional development (NCLB 2003).

Finally, Learning Village can help districts get the most out of the dollars they spend on materials and professional development by helping teachers use those resources efficiently. The NCLB also makes a number of specifications that address the use of technology while amplifying the four pillars:

- using technology to improve student academic achievement
- integrating technology effectively into curricula and instruction that are aligned with challenging standards
- enhancing the ongoing professional development
- encouraging the effective integration of technology resources to establish research-based instructional methods that can be widely implemented as best practices by State educational agencies and local educational agencies (NCLB 2002).

Again, Learning Village fits comfortably into this framework and supports these legislated uses of technology in education.

VI. The Value of Learning Village

The Learning Village application is designed to support the dynamic school in its pursuit of high-quality education. It helps them set and maintain goals, strive for constant improvement, and establish their school as a practice-based learning community.

There is a significant value in structuring the work of the school with a tool such as this. Learning Village makes teaching more efficient as teachers begin to find resources, techniques, solutions, and lesson ideas exactly when they need them.Learning Village reduces duplication of teaching effort and encourages collaboration across grades by helping teachers to identify when and how topics are introduced, mastered, and assessed. It displays lessons in the context of what came before it and what follows.

Learning Village manages the distribution of effort by coordinating from a central place the creative efforts of many individuals. Indeed, the curriculum map itself, as a place to put resources, will continue to grow and change as teachers and administrators identify new resources for inclusion.

Learning Village leverages the skills of the most capable teachers and administrators. The talented practitioners in the District are a critical resource and the Learning Village offers a mechanism to put their expertise and insights to greater use.

Learning Village helps schools address many of the challenges of the No Child Left Behind legislation. Learning Village delivers on the promise of technology. Accessing and managing the vast amount of information housed in the curriculum map cannot be handled effectively in any other way.

VII. References

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