Knowledge Building International Project - KBIP
Computer-Supported Collaborative Learning Model
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The KBIP computer-supported collaborative learning model serves as a resource that fulfills the goals proposed by the U.S. Department of Education to engage and empower learners.

The model of learning described in this plan calls for engaging and empowering learning experiences for all learners. The model asks that we focus what and how we teach to match what people need to know, how they learn, where and when they will learn, and who needs to learn. It brings state-of-the-art technology into learning to enable, motivate, and inspire all students, regardless of background, languages, or disabilities, to achieve. It leverages the power of technology to provide personalized learning and to enable continuous and lifelong learning.
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- Critical Thinking, Problem Solving, Decision Making
- Creativity and Innovation
- Learning to Learn, Metacognition Ways of Working
- Collaboration (Teamwork)
- Tools for Working
- Information Literacy
- Information and Communication Technology Literacy
- Living / Working in the Knowledge Society
- Citizenship – Local and Global
- Life and Career
- Personal and Social Responsibility

Deep Learning Constructivism for College Readiness and Acquiring 21st Century Skills

Community of Practice for Educators with Ongoing Professional Development and Mentoring

Internet - Enabled Technology-Enhanced Pedagogy, Methodology and Tools for Learning in Small Groups

Video-Conferences to Partner Students and Educators World-Wide

Formative Assessments of Academic Achievement and Student Learning

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Analytic Tool
Basic Knowledge Building Measures

Authors can be identified on certain papers via individual perspective or as a group.

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Knowledge Building (KB) theory addresses the need to educate people for the knowledge age society, in which knowledge and innovation are pervasive. Knowledge-building pedagogy aims to facilitate the learning process needed to create knowledge. We begin knowledge building in middle school to capture natural inquisitiveness and a joy of learning.

In a knowledge-building classroom, teachers guide their students through the process of creating new cognitive artifacts as a result of common goals, group discussions, and synthesis of ideas. These pursuits should advance the current understanding of individuals within a group, at a level beyond their initial knowledge level, and should be directed towards advancing the understanding of what is known about that topic or idea.
Individual Learning – vs – Collaborative Learning

Diagram by Monica Resendes
From.... Factory-era classrooms

We have arrived at a tipping point in education that compels us to abandon factory-model schools that were designed to meet the needs of an isolationistic, industrial economy. The knowledge society in which we live demands an education model that is technology-infused for a global economy that is fueled by innovation and creativity.

To.... 21st Century classrooms

Classrooms where learning is a by-product of the creation of new knowledge, and students can acquire new and different skills to enhance their capacity to hone critical thinking and problem-solving skills working in Collaborative Learning Environments.

The delivery of standardized content has become obsolete and ineffective in preparing young people to live in the knowledge age of an interdependent world.
A factory-era classroom positions the teacher as a stand-alone transmitter of information and facts. The role of the teacher is to pass on a standardized fixed body of knowledge and skills to students, who would use them to engage in predictable careers and pursuits.

In a knowledge-building class, the teacher becomes a facilitator of information and a coach and mentor to students, who become contributors to group discussions for collaborative learning. A knowledge-building classroom is arranged for group discussion with multiple interactions for discourse around ideas and theories utilizing the Knowledge Forum®, an electronic workspace that transforms individual ideas into group knowledge. Teachers also lead an exploration of ideas that complement authoritative resources, prompting creativity and innovation, critical thinking, communication and collaboration.
Knowledge-Building Beginning in Middle School

Technology has transformed the ways in which we live, work, play and learn. Today, people access, use and create information very differently from the way they did in previous decades.

NetGen students populate the 21st-century classroom. Unique thought patterns of these “Digital Natives” require changes and shifts in learning and teaching: from instruction to construction and discovery; from teacher as a transmitter to teacher as a facilitator and mentor; from teacher-centered pedagogy to learner-centered education.

By fifth grade, students possess a surprising scope of interests, having grown up around an increased use of and familiarity with technology, media and communication. It is easy to do research on the knowledgeware platform, Knowledge Forum® (KF), and accessing different formats of authoritative resources captures their attention for engaging and empowering learning.

Because they are tasked with reporting on their research, KB students acquire important communication skills, presenting before their classmates and partnered classrooms. They also become very proficient with multi-media tools to post videos and power-points to the KF database.
Important developmental factors in 10-12 year olds make knowledge building so invaluable to middle-school students. At this age, they are capable of increasing independence, are also developing important communication skills, and are becoming more mature. At ten years old, a child improves listening and responding skills, and increases problem-solving abilities, skills that are nurtured through knowledge-building activity. They also tend to be improving their self-concept and acceptance of others. This facilitates engaging them in discourse to share information with each other and improve the knowledge advancement in the classroom. Furthermore, knowledge-building students use a global/local lens to study common themes, making local problems global with a recognition that they are citizens of a globally-connected, interdependent world they have inherited, and must be prepared to become the future leaders of society.
Why Middle School Is An Optimal Setting For Learning with Knowledge Building

Middle school is a great time to learn foreign languages, to understand basic principles and apply the scientific method, to set goals and learn time management skills, all facilitated by knowledge-building pedagogy. In fifth grade KB classrooms, “we” supersedes the sense of “I” and there is a feeling that the group is operating collectively.

We also start them young to take advantage of a time when fewer distractions and competing interests for their time are present. Middle school students still have that joy of learning, and teachers can easily tap into the natural curiosity, creativity and innovative thinking of young minds before students are entrenched in obsolete learning methods and inefficient learning environments, where there is little reason to learn and even less motivation to innovate and be creative. Being in middle school is also the time in their lives when students begin to form skills that will serve them well for their future entry into the workforce and becoming productive citizens of the societies in which they live.
Knowledge creation encompasses invention, innovation and creative additions to the supply of useful knowledge and ideas. The knowledge-creating communities and collaborative learning environments supported by knowledge-building pedagogy foster the creation and continual improvement of community knowledge.

Knowledge-building classrooms are becoming the laboratories for developing important 21st Century skills such as critical thinking, collaboration, communication and creativity – the 4cs of future education. In order to thrive in today’s interdependent world, it is paramount that students begin to master these skills at an early age to set them on the path to success in education, in the workforce, and in life.
College Readiness for Success in Education

Research shows that if students are prepared to succeed in college entry-level courses, they will most likely be able to cope with the full range of college courses they can encounter throughout their academic studies. But in order to prepare students for college readiness, we cannot wait until they are approaching college age to prepare them for college success.

To be successful in school, students must be able to learn based on a broad set of competencies: the ability to be good, analytical readers of oftentimes complex materials; skilled at seeking out information and researching answers to problems; the ability to distinguish between useful and irrelevant material. Students – and future professionals alike – need to use these skills to learn quickly, sometimes under pressure, and on their own, to handle the challenges of academic study and demands of the labor market later in life.

Study skills, time management, awareness of one’s performance, persistence, and the ability to utilize study groups are important attributes also imparted by participation in knowledge building collaborative learning environments.

**College Readiness**

“The level of preparation a student needs in order to enroll and succeed — without remediation — in a credit-bearing general education course at a post-secondary institution that offers a baccalaureate degree or transfers to a baccalaureate program.”

**College Success**

“Completing entry level courses at a level of understanding and proficiency that makes it possible for the student to consider taking the next course in the sequence or the next level of course in the subject area.”
Promoting 21st Century Skills

A KBIP classroom imbues students with a set of interrelated skills and knowledge that are aligned with 21st Century skills. These include:

- Creativity and Innovation
- Critical Thinking, Problem Solving, Decision Making
- Learning to learn, Metacognition
- Ways of Working
- Communication
- Collaboration (Teamwork)
- Tools for Working
- Information Literacy
- Information and Communication Technology Literacy
- Living and Working in a Global Economy
- Citizenship - Local and Global
- Life and Career
- Personal and Social Responsibility

This range of developmental schemes for competence characteristics was identified by the Assessment and Teaching of 21st Century Skills (ATC21S) Project, sponsored by Cisco, Intel and Microsoft.
Knowledge Building can be used in a wide variety of learning communities (i.e. students inside and outside the classroom such as in community-based and after-school programs), and in a wide range of subject matters, disciplines and age groups. It makes learning relevant to students. We can also see from the case study below how engagement in hands-on activities changes not only the student but the teacher as well.

**CASE STUDY: A Multidisciplinary Approach to Studying STEM – Science, Technology, Engineering and Mathematics.....**

Welcome to the Mr. Hamilton’s math class, working with his students on improving the long jump for an upcoming sports competition. Students create digital media that trace their practice sessions, and by watching their videotaped performances in long-jump trials and comparing their performance to grids and charts, students study important concepts in math and physics that explain angles, momentum and distance.

They also study physiology and begin to understand how muscles work, learn how nutrition contributes toward the formation and maintenance of healthy muscles, And can work together in small groups to share their ideas on how to improve their long jump and increase their distance. This multi-disciplinary approach to learning has a direct impact on a focused subject matter or discipline and on complementary areas of studies as well.
The case study demonstrates how small group exercises allow an entire class to master math and physics concepts of the content being studied in a standards-based curriculum while also learning complementary aspects of biology and life sciences. Students not only acquire a deeper understanding of the subject matter, they perform better all around on tests. Mr. Hamilton’s students are motivated to learn because they are studying THEIR muscles, THEIR performance and THEIR potential.

Many of the students in Mr. Hamilton’s class volunteer to become peer tutors to work alongside their teacher, to produce digital media that reflect the curriculum and standards that students are expected to master. Mr. Hamilton taps into his own creative potential by overseeing the production of content tailored to his students.

Under the status quo of teaching, mathematics teachers are expected to be content conveyors, following pre-defined curriculum in preparation for accountability tests; they are not expected to be creative in producing content or developing multi-media. Knowledge-building pedagogy allows the creativity and innovation of both teacher and student to be maximized in the classroom setting.
Another innovation of the model is that students working in Knowledge-Building CSCL environments come to see themselves and their work as part of a global community with common problems that transcend geography and nationalities. When students work collaboratively with peers and become contributors to a world-wide network, they learn to evaluate problems from a societal point of view and apply an “act locally/think globally” mindset to problem resolution. With the KBIP CSCL model, students consider real-world, authentic issues, researching and acquiring knowledge from authoritative sources. Working in small groups or teams, they are able to theorize, propose, and evaluate solutions. This methodology is the same as that used by advanced research organizations and businesses to develop new ideas, create new technologies, and solve real-world problems.

Learning to apply a societal view and scientific approach to problem solving arms students with the 21st Century skills needed to prosper in a global society. And being international in nature, KBIP nurtures international relations formed at an early age.
Our vision is to share local problems on a global platform and open classrooms to an international audience to “co-build” solutions. We currently have networked schools on four continents working together on projects around common themes like sustainability, climactic change, water and pollution, issues that impact every person on this planet. In this way, KB students come to realize that what happens locally can have global impact.

The common theme of the 2014-2015 school cycle of the Knowledge Building International Project is “Smart Cities”. The project involves learning about strategies for achieving growth of a community in a "smart " sense by, for example, optimizing energy efficiency, capitalizing on new technologies, developing partnerships to transform systems, more open government, etc.

www.globalskillslearning.com/smart_cities.html
Both students and teachers are able to upload presentations, plan future activity, and utilize the white board function. Our videoconferencing partner is VIA, providing a closed session where participation is by invitation only thus assuring online privacy and Internet safety. Sessions are recorded for asynchronous learning.
A Comparison:
Factory-era classrooms and obsolete teaching methodology with knowledge-building classrooms and 21st Century teaching methodology

- Books form the base of learning, which quickly become outdated with the advancement of knowledge and technology. New edition textbooks must be published regularly to update content that reflect these advancements.

- Classroom is forward-facing, focus placed on the teacher with singular interaction explicit teaching of a fixed, standardized body of knowledge and skill-sets using lectures or demonstrations of the material.

- Teachers often experience classroom management problems, especially when facing overcrowding factors.

- Knowledge-building learning environments take advantage of a wide range of authoritative resources that supplement book-based knowledge. Students access newspapers, magazines, videos, and the Internet for content that will support their theories. They become proficient in the use of media and presentation tools to show the results of their research.

- Computer-supported collaborative learning environments are arranged in small group clusters, where every member of the group contributes to building collaborative knowledge.

- Classroom management is enhanced because students work in small groups. The teacher, as a coach and mentor, is able to circulate amongst the groups to guide the learning process.
Assessment tools evaluate a student’s abilities, aptitudes or performance based on a specific kind of cognitive and memorization-based intelligence.

Testing methods are often based on multiple choice questionnaires that cannot provide an effective assessment of literacy skills.

Multiple-choice question testing measures only a portion of the skills and knowledge outlined in state educational standards. They do not align well with what we know about how students learn. Nor do they tell us very much about how to help students do better.

More often than not, test scores are received after instruction has been completed, thereby denying the teacher any opportunity to make adjustments to coursework.

Assessment tools provide evidence in real time for determining how well lessons are taught and teacher efficiency, and how well students learn and the gains they make, as well as the practical applications of knowledge;

Students in knowledge-building classrooms are constantly reading and writing, so testing can also be geared towards providing evidence of improved literacy and language skills;

Knowledge Forum® has been designed specifically to support high-level knowledge processes; analytic tools enable teachers to see at a glance the discourse and participation patterns, as well as growth in semantic content;

Results from the analytic tools can be fed back into the work as it proceeds, rather than waiting until the end of a unit of work to provide feedback, when it is too late to make adjustments.
Knowledge-building teachers and administrators belong to a network to partner classrooms on both a national and international basis, to share ideas and best practice, and for professional development. They are able to interact with both newcomer and veteran knowledge builders to view and discuss the work of innovative practitioners and researchers that work toward preparing today’s students for tomorrow’s challenges by infusing 21st Century skills.

Knowledge-building educators – teachers with teachers, principals with principals, auxiliary teaching staff with their colleagues – are partnered with more experienced knowledge-building educators for mentoring. By becoming members of the KBIP Community of Practice, they are able to network to share experiences, access resources and material, and also learn from one another.
A Technology-Enhanced Solution

The KBIP model involves the use of computer-supporting collaborative learning (CSCL) educational computing software in the classroom for constructivism learning. The software – Knowledge Forum® – is hosted on local servers or on an Internet-based platform with multiple access points and work stations. This electronic workspaces transforms ideas into collective knowledge by hosting a space for students to discuss, synthesize and analyze information about specific topics in the curriculum.

KF supports tools and applications including:

- **Databases** are hosted on the platform where students can submit ideas, share information, reorganize knowledge, and ultimately summarize, or "rise-above", to synthesize new understandings. This is only achieved when all members of the group contribute to building the knowledge around the given subject.
Scaffolds help users frame their ideas and present them to the community, contributing them to a communal database where notes are stored:

- **HARD SCAFFOLDS** facilitate the writing process and assist in structuring the thought process and improving ideas.
- **SOFT SCAFFOLDS** give support during the time of class discussion and contribute to the process of improving ideas.

Scaffolds can be customized and changed to suit different purposes and groups.

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**My Theory**

“I think Global Warming is a problem that impacts us all. Climactic change creates other problems that change the world as we know it.”

(My theory)

"Global Warming is produced mainly because gas in the earth’s atmosphere trap some of the heat from the sun....“

(New information)

The use of Scaffolds involves the ability to express ideas and to discuss opinions with a good command of language. Methodological competencies set out real inquiry questions that can offer grounds for research, plan work and support the process of gathering information. It is amazing how easily students get involved in the use of Scaffolds. Even young students can manage the use of Scaffolds in just one or two sessions.

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**This theory cannot explain**

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**I need to understand**

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**New Information**

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**Which scaffold would be most appropriate?**

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**A better theory**

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**Rise Above**
Theory Behind The Practice

Successful Knowledge Building is based on the 12 characteristic hallmarks of collaborative learning discourse, referred to as knowledge building principles. Two decades of research on knowledge building (KB) — defined as “the production and continual improvement of ideas of value to a community” — with the “community” referring to student groups — show that students at all ages can work collaboratively to build new knowledge.

Real Ideas, Authentic Problems
In a knowledge building classroom, learners are concerned with understanding, based on their real problems in the real world. Ideas produced or appropriated are real, and problems are ones that learners really care about — usually very different from textbook problems and puzzles.

Improveable Ideas
All ideas are treated as improvable. Participants work continuously to improve the quality, coherence, and utility of ideas. For such work to prosper, the culture must be one of psychological safety, so that people feel safe in taking risks — revealing ignorance, voicing half-baked notions, giving and receiving criticism.

Idea Diversity
Idea diversity is essential to the development of knowledge advancement. To understand an idea is to understand the ideas that surround it, including those that stand in contrast to it. Idea diversity creates a rich environment for ideas to evolve into new and more refined forms.

Epistemic Agency
Students themselves find their way in order to advance. Participants set forth their ideas and negotiate a fit between personal ideas and ideas of others, using contrasts to spark and sustain knowledge advancement rather than depending on others to chart that course for them. They deal with problems of goals, motivation, evaluation, and long-range planning that are normally left to teachers or managers.

Community Knowledge, Collective Responsibility
Students’ contribution to improving their collective knowledge in the classroom is the primary purpose of the Knowledge Building classroom. Contributions to shared, top-level goals of the organization are prized and rewarded as much as individual achievements. Team members produce ideas of value to others and share responsibility for the overall advancement of knowledge in the community.

Democratizing Knowledge
All individuals are invited to contribute to the knowledge advancement in the classroom and all participants are legitimate contributors to the shared goals of the community; all take pride in knowledge advances achieved by the group. All are empowered to engage in knowledge innovation.
A goal for Knowledge building communities is to have individuals and organizations actively working to provide a reciprocal advance of their knowledge. Expertise is distributed within and between communities. Symmetry in knowledge advancement results from knowledge exchange and from the fact that to give knowledge is to get knowledge.

Knowledge building is not confined to particular occasions or subjects but pervades mental life — in and out of school.

All members, including the teacher, sustain inquiry as a natural approach to support their understanding. To know a discipline is to be in touch with the present state and growing edge of knowledge in the field. This requires respect and understanding of authoritative sources, combined with a critical stance toward them.

Students are engaged in discourse to share with each other, and to improve the knowledge advancement in the classroom. The discourse of knowledge building communities results in more than the sharing of knowledge; the knowledge itself is refined and transformed through the discursive practices of the community, having the advancement of knowledge as their explicit goal.

Students take a global view of their understanding, then decide how to approach their assessments. They create and engage in assessments in a variety of ways. Assessment is part of the effort to advance knowledge, used to identify problems as the work proceeds and embedded in the day-to-day workings of the organization. The community engages in its own internal assessment, which is both more fine-tuned and rigorous than external assessment, and serves to ensure that the community’s work will exceed the expectations of external assessors.

Through a sustained improvement of ideas and understanding, students create higher level concepts. Creative knowledge building entails working toward more inclusive principles and higher-level formulations of problems. Learning to work with diversity, complexity and messiness results in new syntheses. By moving to higher planes of understanding knowledge builders transcend trivialities and over-simplifications and move beyond current best practices.
So.....

how do we get knowledge-building technology and methodology into the classroom? **Our objectives:**

1. If we want knowledge building to bring about systemic change to have important implications for curriculum, instruction, assessment and professional development, we need to involve students, teachers, parents and school administrators. We also need to engage in nonpartisan advocacy among community members, government regulators and policymakers through briefings, grassroots, the media, and social media outlets. And, recognizing that it does take a whole village to raise a child, that education is intricately entwined with myriad social and human service issues, and that we will not find success by working in a vacuum, we must join forces with like-minded and complementary organizations, people and institutions to work toward real, long-lasting and relevant education reform.

2. We need to recruit good teachers who can become great KB facilitators. We need to find teachers who believe that the time has come to move away from the norms that governed factory-era schools and embrace those that prepare students with 21st Century skills, breaking with the teaching practices and traditions of the past to embrace technology. And we need to energize them to overcome the resistance they will receive from vested interests as they attempt to modernize an outdated and obsolete education system.

3. When we find good KB teachers, we must nurture them, train them, and reward them with personal and professional opportunities to participate in transforming their schools into 21st century learning organizations. We must organize for them venues, tools and opportunities to collaborate with other KB teachers and administrators to learn from each other, share material and discuss important issues such as assessments, classroom management, and ways to address socio-economic barriers to accessing education and improving outcomes. Finally, we will have to engage innovative and enlightened funders to help defray the costs in the short-term for long-term gains.
Components of the Knowledge-Building Classroom
A Blueprint for Success

Train the teacher in methodology and applications with hands-on learning sessions to master the Knowledge Forum platform and other knowledgeware.

Assure technology compliance in the classroom with adequate computers, Internet connections, web cams, white boards and other tools.

Secure the license needed to utilize the knowledgeware platform and create the data base that will be used as the basis for knowledge-building activities. Establish the servers or secure a hosting service that will house the data bases.

Get to work with the students to create the data base, do the research and engage in exciting knowledge building activities.

Network with other KB teachers, share ideas and materials, get your community involved, and pursue professional development opportunities. Attend conferences workshops, and the annual Summer Institute, where the extended community of knowledge builders can come together to share achievements, set a course for future developments, and interact with both newcomer and veteran knowledge builders to view and discuss the work of innovative practitioners, researchers, and engineers from around the world.
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The Knowledge Building International Project
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