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Research Supporting
Student-Directed Project-Based Learning

Constructivism:

Constructivism is a philosophy of learning founded on the premise that, by reflecting on our experiences, we construct our own understanding of the world we live in. Each of us generates our own "rules" and "mental models," which we use to make sense of our experiences. Learning, therefore, is simply the process of adjusting our mental models to accommodate new experiences.

"Contructivist Learning Environments (CLE) provide a question or issue, a case, a problem or a project that learners will attempt to solve. Ownership of the problem or learning goal is the key to meaningful learning. Students must be provided with interesting, relevant and engaging problems to solve." – David Jonasson

Brain Research: The Brain is a Learning System – Caine & Caine

- ❑ There is an innate urge in every person to grow and connect
- ❑ All of us are constantly adapting to our environment
- ❑ Social relationships and human interactions have an enormous impact on learning
- ❑ Learning and teaching must be related to the real questions students ask
- ❑ All learners search for patterns
- ❑ It is our emotions that tell us how significant or insignificant something is and what value to place on it
- ❑ Every brain simultaneously perceives and creates parts and wholes; integrating content and life experiences best way to take advantage of this phenomena
- ❑ Learning is always an unconscious and conscious process
- ❑ Memory is organized in either the taxon system or locale system; the locale system is much more potent
- ❑ Environments need to be enriched by complex, stimulating and safe experiences
- ❑ Complex learning is enhanced by challenge and inhibited by threat
- ❑ Education needs to deal with individual developmental differences; none are in the same place at the same time
- ❑ There are three main elements to guide the practice of education:
  - Relaxed alertness as an optimal state of mind
  - Orchestrated immersion in complex experiences in which curriculum is embedded
  - Active processing of the experiences

Foundation for Learning: Jennings and Caulfield

- ❑ Each brain is as unique as a fingerprint
- ❑ The brain changes physiologically as a result of experience
- ❑ IQ is not fixed at birth
- ❑ Intelligence is multiple
- ❑ Learning is strongly influenced by emotion
- ❑ The brain enjoys learning
- ❑ The brain requires stimulation to flourish
- ❑ The brain needs novelty and challenge
- ❑ The brain learns best from choice and action
- ❑ The brain is meaning driven
- ❑ The brain seeks connections
- ❑ The brain needs feedback for growth

Research on Project-Based Learning: Buck Institute

Research shows that when project-based learning emphasizes:

- ❑ Depth of understanding rather than content coverage;
- ❑ Comprehension of concepts and principles rather than knowledge of facts;
- ❑ Development of complex problem-solving rather than building block skills in isolation;
- ❑ Student interest rather than following a fixed curriculum;
- ❑ A broad, interdisciplinary focus rather than a narrow, discipline-based focus;
- ❑ Using direct, primary, or original sources rather than texts, lectures, and secondary sources;
- ❑ Data and materials developed by students rather than teachers;

a powerful learning experience is created!

Best Practices in Education: Education Leadership, November 2002

- ❑ Invite kids to learn; learners ought to be treated as persons who must contribute, have purpose, have power to choose, and be challenged – Tomlinson
- ❑ Students are motivated by doing what is challenging and feels both like work and play – "flow" – Csikszentmilhalyi
- ❑ What motivates students is feeling useful, feeling competent, belonging, feeling potent, and feeling optimistic – Sagor
- ❑ Do local projects – place-based, solve real problems, activate interests – Smith
- ❑ Open-ended inquiry, learners accepting responsibility for behaviors, owning their own ideas, and creating acclimate of caring are good practices for learning – Roberts
- ❑ Effort is increased by students doing projects selected on interest, field work, and have a culminating event – Curtis
- ❑ Learners are more motivated when students are allowed to construct their own learning opportunities, use multiple connections to integrate, and allow student voice – Findley
- ❑ Students want responsibility, want personalized learning opportunities, want to be cared about, want experiential learning, want high expectations, want self-directed learning, and need to have their voices heard – Easton

Seven factors that influence student motivation: Wagner

- ❑ Teachers know their students well
- ❑ The curriculum is intellectually challenging and engaging
- ❑ Student's voice is encouraged
- ❑ Students have opportunities for "real-world" learning
- ❑ Students have an emotional support system
- ❑ The school forges close ties to parents
- ❑ The school provides a safe and respectful environment

Hope Study: Van Ryzin

- ❑ Students who have a high sense of autonomy, control and belongingness have higher motivation and engagement
- ❑ Students who have high sense of the above will have a higher sense of Hope (as measured through agency and pathways), which is highly correlated to success in life

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Theory and Philosophy on Advisories

The Five C's for Advisors: Newell

- ❑ Centeredness – a sense of peace in who you are and a feeling that you matter to the world
- ❑ Caring – really want to help nurture youth, unconditional love
- ❑ Competence – know your field of expertise and have a sense of the Big Picture
- ❑ Confidence – in yourself, your knowledge, your mission
- ❑ Creativeness – constantly learning and growing yourself, modeling transformative education

Create a Humane Environment: Jennings and Caulfield

- ❑ A safe secure setting
  - Includes paying attention to each learner, having a student-counselor relationship, attach importance to student interests, create attractive, convivial surroundings, help fellow learners know each other well, avoid sorting and labeling students
- ❑ Orchestrate input and stimulation
  - Increase the number of field trips, community interactions, projects in reality and complexity
  - Call upon the resources of the community
  - Capitalize on the inherent diversity of the advisory-school body; encourage projects on diverse groups, opinions, interests
- ❑ Have meaningful, experiential learning experiences as a group
  - Arrange exchanges with other advisories, schools, Internet groups, etc.
  - Use project-based learning that challenges learners to format inquiry and satisfy curiosity
  - Create teams to investigate topics
  - Active learning ought to be encouraged
- ❑ Use accurate, timely feedback
  - Coach as opposed to teach – gentle suggestions
  - Use self-assessment
  - Use exemplars and portfolios to show good work
  - Use personal conferencing, one-on-one guidance
  - Personalize learning plans
  - Be explicit with your objectives
  - Use technology for instant feedback in non-threatening way
  - Celebrate learning

How to Develop Personalized Learning Environments: Lieber & Poliner

- ❑ Positive personal relationships with teachers and sufficient bonding with peers are keys to student success
- ❑ Know your students – do an inventory, such as MAPP
- ❑ Create opportunities for students to get to know each other and work with each other
- ❑ Use meaningful opening and closing activities in advisories
- ❑ Establish clear norms, boundaries, procedures, and consequences
- ❑ Build a cohesive community of learners (see books for ideas)
- ❑ Meet the needs of diverse learners (see books for ideas)
- ❑ Set high expectations, and provide high caring- high support situations (see books for ideas)

Hope Index: Van Ryzin

A high degree of perceived support of teachers and peers will provide more motivation, engagement, and consequently will build a student's Hope Index. Advisories ought to be very aware of the implications.

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Theory and Philosophy on Learning Communities

Six Strands that Build Learning Communities: Collay, et al

1.	Living Organizations	Piaget, DeGreus	Building Community
2.	Constructivist Learning	Vygotsky, von Glasersfeld	Constructing Knowledge
3.	Group Process	Schmuck, Runkel	Supporting Learners
4.	Complex Systems	von Bertalanffy, Perrow	Documenting Reflection
5.	Optimal Experience	Cszikszentmahalyi, Bohm	Assessing Expectations
6.	Interdependent Networks	Kegan, Capra	Changing Cultures

Components of a Teacher Leader Community: Lambert

- ❑ Teachers, parents and students ought to be skillful leaders
- ❑ Shared vision results in program coherence
- ❑ Inquiry based use of information should be used to inform decisions and practice
- ❑ Broad involvement, collaboration, and collective responsibility should be reflected in roles and actions
- ❑ Reflective practice should lead consistently to innovation
- ❑ High or steadily improving student achievement ought to be the outcome

Democratic Circles: Bussler

- ❑ People are social by nature
- ❑ Relationship is basic to content
- ❑ Guiding behaviors built on principles govern actions
- ❑ Restorative practices rather than punishments
- ❑ Social democracy via the circle process

Social Conditions that Lead to Engagement in Schools: National Research Council
Educational context (school climate, organization, composition, size) and instruction lead to beliefs about competence and control, values and goals, and social connectedness, which lead to academic engagement.

- ❑ Promote perceptions of competence and control (see Hope Study)
- ❑ Promote academic values and goals
- ❑ Emphasize higher order thinking
- ❑ Do active participation
- ❑ Do collaborative activities
- ❑ Create meaningful connections to student culture and lives outside of school
- ❑ Promote a sense of belonging (note Hope Study as well)

Educating for Human Greatness: Stoddard

- ❑ Value the identity of each student
- ❑ Value interactions between students and staff
- ❑ Value inquiry, interests of each person

See Wagner's seven factors influencing school motivation – all have to do with creating a great learning community.

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Theories and Philosophies on Assessment

Project-based Schools are created to help students:

- ❑ Create depth of understanding rather than do content coverage
- ❑ Comprehend concepts and principles rather than know facts
- ❑ Develop complex problem-solving rather than build block skills in isolation
- ❑ Utilize student interest rather than follow a fixed curriculum
- ❑ Create a broad, interdisciplinary focus rather than a narrow, discipline-based focus
- ❑ Use direct, primary, or original sources rather than texts, lectures, and secondary sources
- ❑ Develop their own data and materials (see above from Buck Institute)

Therefore, assess the mission! What students need to know for graduation and how their level of competency will be tested are inseparable! – Wagner

Six competencies that high school students ought to master: Wagner

- ❑ Literacy – a working command of reading, writing, and speaking
- ❑ Mathematically competence – computational skills required in the modern workplace and everyday life
- ❑ Problem-solvers – eager to search out information, discover answers, and apply skills in reasoning and critical thinking
- ❑ Scientifically literate – capable of appreciating nature and the environment, familiar with scientific method and role of science in modern life
- ❑ Good citizens – well grounded in the forces and values that have shaped the nation historically, culturally, demographically, politically and economically and an appreciation of the relationship of the US to the rest of the world
- ❑ Technologically advanced – comfortable with technologies, using computers, of everyday and the working world

What the public says is essential for high school's to teach and assess: Wagner

- ❑ Basic reading, writing, math
- ❑ Good work habits
- ❑ Computer skills and media technology
- ❑ The value of hard work
- ❑ Values such as honesty and tolerance of others
- ❑ Habits of good citizenship
- ❑ How to deal with social problems
- ❑ American History and Geography
- ❑ Curiosity and the love of learning

Assess knowledge, process, and dispositions – knowing, doing, and being: Newell

- ❑ Assess information from the project in order to ascertain content standards have been met
- ❑ Assess the process used by the student in application of work habits, skills, problem-solving, etc
- ❑ Assess the dispositions displayed during the daily activities, such as curiosity, good citizenship, honesty and tolerance, etc

Assessment ought to be more than one-shot testing: National Research Council

"Teachers should monitor continually the effectiveness of practices, not only for progress in learning, but whether students are staying engaged behaviorally (attendance, completion of work), cognitively (efforts to understand and apply concepts), and emotionally (enthusiasm for learning activities).

Theories on Use of Technology in Innovative Schools

Vision for Increased Technology Usage: Seymour Papert

"School is a place where students learn largely by working on projects that come from their own interests—their own visions of a place where they want to be, a thing they want to make or a subject they want to explore. The contribution of technology is that it makes possible projects that are both very difficult and very engaging. It is a place where teachers do not provide information. The teacher helps the student find information and learn skills—including some that neither knew before. They are always learning together. The teacher brings wisdom, perspective and maturity to the learning. The student brings freshness and enthusiasm. All the time they are all meeting new ideas and building new skills that they need for their projects. Some of what they learn belongs to the disciplines school has always recognized: reading, writing, mathematics, science and history. Some belongs to new disciplines or cut across disciplines. Most importantly, students and teachers are learning the art and skill and discipline of pursuing a vision through the frustrating and hard times of struggle and the rewarding times of getting closer to the goal. The first idea about using computers in education was to use them to do a little better what schools were already doing. This is not a criticism. It is the way a movement towards radical change has to start. But the time has come to move beyond "technology-aided school." It is time to open our minds to radical change in the institution of school itself."

Technology makes it possible to open new directions for learning.

- The Economic Imperative: Digital technology in the workplace requires a new definition of "basic skills". The transformation of work requires much more than a mastery of a fixed curriculum inherited from past centuries. Success in the slowly changing worlds of past centuries came from being able to *do well what you were taught to do.* Success in the rapidly changing world of the future depends on being able to *do well what you were not taught to do.* Already a great number of Americans are doing jobs and using skills that did not exist when they went to school -- soon it will be the majority.
- The Social Imperative: As the slow evolution of school lags further and further behind the rapid evolution of society, increasing numbers of students all over the world see school as irrelevant to life. Many drop out. Many more drop out mentally, emerging from school with poor skills and negative visions of themselves and the society they are entering.
- The Moral Imperative: Because of our technology we *can* restructure our education system. Because of our commitment to democracy we *must* do it. The image of Jane acquiring powerful knowledge previously inaccessible to all children puts a spotlight on a new ways in which privilege breeds greater privilege. Having a personal computer and the freedom to use it to follow personal learning gives Jane access to a new world of knowledge. If some are left out, the gap between the "haves" and the "have-nots" will grow exponentially.

"Throwing a lot of computers into an otherwise unchanged school will just leave you with an unchanged school." – Papert

"The computer's true power as an educational medium lies in the ability to facilitate and extend children's awesome natural ability and drive to construct, hypothesize, explore, experiment, evaluate, draw conclusions -- in short to learn -- all by themselves. It is this very drive, Papert contends, that is squelched by our current educational system." – Dan Schwartz, An Interview With Seymour Papert

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