Executive Summary

The Allamakee Community School District's
Community Connection Learning Center (CCLC)

Prepared
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Executive Report

Quality educational programs grow from careful observation of the local culture and the specific students under the care of qualified and interested staff. These observations lead to the construction of local practices that become a framework for the specific school districts programs. To better understand and improve on these local practices it is necessary to disseminate the specifics of these practices thus creating a space for feedback and criticism. However, these program do not originate exclusively with the local educators, rather they are a part of a large network of students, theorist and practitioners.

The mind map shown here is a model showing the way a group of students understood themselves and their relationships with others and their worldview. This is a momentary snapshot drawn from a research project conducted with Viterbo students several years ago. Within limits this model is an indication of the educational milieu of the student. The mind map may be helpful to the readers as they think about the school environment as well as the before/after school programs and clubs that are a part of the CCLC programs.

Like the mind map much of the knowledge and information about educational practices comes from ideas that are “in the air” but whose particulars are unknown to the educators who apply them. Other ideas presented in this report are gleaned from the literature regarding best practices and other research findings. Directions and steers from state departments of
education and university based teaching programs also contribute to the knowledge and application presented here.

As local educators make what they find public, it becomes easier for them to access and apply research and practices in other parts of the country and the world. The reason for the increased access to new ideas is partly due to processing “what works” in the local setting and to the evaluators feedback on these programs.

**Highlights**

Programs selected here are intended to feature those characteristics of the CCLC Clubs and the before/after school activities that best exemplify solid educational practices and also allow for an opportunity to enhance the generalizability of these practices and improve on the general quality of instruction as now practiced. While the selection of these programs and activities has not been systematic, the selection process was not random. These programs represent the ideals of the CCLC as outlined in the grant application and are referenced in general terms in Evaluation Reports of James Veale, PhD and Jan Mitchell, PhD. as well as lesson plans from instructors and some classroom observations.

Jerome Bruner in *The culture of education* (1996) argues that improvement in instruction come in part from understanding the minds of students. In arguing that educators and staff need to work to understand the “minds of children,” Bruner develops the importance of the relationship between culture and education., i.e., the mind of the other can only be understood within the larger culture. This point is similar to some of
the ideas presented in the Key Findings section (Committee on Developments in the Science of Learning, 2001) as represented in the phrase: Begin where the students are.

Knowing, as well as we can, the mind of the students leads to different approaches to education. Different approaches to learning, to discovery and different forms of instruction – from imitation, to instruction, to discovery, to collaboration – reflect different beliefs and assumptions about the learner – from actor, to knower, to private experiencer, to collaborative thinker (Bruner, 1996, p 50).

Two programs start this review as they stand out for their focus on the use of recent technology (Robots and 3D printers) and are following the current emphasis of many programs that accentuate the STEM curriculum. These technologies are at risk of being all about the technology and little about the science education that is essential to the program. However, this is not the case with the programs under review. These programs begin with intrinsic interest, that is, the “buzz” of new technology and go on to build skills and knowledge in the sciences.

Robots

This report begins with the robot program as it has been implemented for several years and has a good track record as measured by student interest and evaluation results. The mere mention of the word “robot” instantly congers up an image of an almost human figure capable of completing assigned task with a simple word command. It is this image of robots that first attracts students to the Robotic Clubs. Some engagement with these clubs brings new understanding and continued interest.
A dictionary definition of robot is a machine capable of carrying out a complex series of actions automatically. A small foray into the etymology of robot provides its Latin origins: “forced labor.” Robot was popularized by a Czech playwright, K. Čapek wherein he coined the term in his play R.U.R. ‘Rossum's Universal Robots’ (1920).

While the robots that students are likely to use will not look like the picture on the left, it is a common representation of a robot in the minds of many. The robots that students build, and program are more likely to be some versions of a vehicle. These vehicles are often used as a part of a competition to see which robot has the best staying power or can outlast the other vehicles in some version of a demolition derby.

Educational robots are most often purchased as kits such as the one pictured here. These kits provide an array of options. Some kits may allow for the combining of elements of one kit with another kit, thus allowing more than following instructions (although building anything from a kit requires the development of several skills; it does not expand students creativity.

The educational value of involving students in Robot Clubs is that the students become fully engaged in the creation of something that can be shown to others as an individual and group accomplishments. Students, working with these kits,
engage in planning, monitoring, and evaluating their work in a non-school-like activity.

What makes the creation of robotic devises not like school is that the goal is a public one – to be shared at minimum with classmates beyond the club members, other teachers and staff and parents. Additionally, the activity has an element of fun, just because they are building robots (it seems).

Watching students from these clubs present their robots to a group of community leaders indicated to this reviewer that the students not only learned how to construct these robots but also understood much of the planning, monitoring, and correction that went into the construction process. Their presentations illustrated of their ability of utilize conceptual strategies for retrieval.

**3-D Printing**

Using a 3-D printer at first blush might appear to be merely a showy bit of technology. However, this technology in the hands of thoughtful and capable instructors is a dynamic learning approach. Much like the use of robots in the CCLC program, 3-D printers are a way of hooking students on planning, problem finding, problem solving, monitoring of progress, and error correction. 3-D printer engagement also teaches and applies knowledge and skills in geometry and algebra, physics, and design.

To make a 3-D copy is not simply a matter of putting something on the top of a machine and pushing a button as one might do with an ordinary copy machine. A project of making a 3D print of something requires conceptualizing, measurement, mechanical drawing, and calculating. Not only do the students need to know and apply the
metacognitive skills and the curriculum requirements in physics and math, but students also engage sometimes directly, some times indirectly with history and social sciences.

The creation of a 3-D copy results not only in an “aha” sense of excitement, but also an opportunity to explore ways to make corrections and improvements. Many times the learning of new material in a class signals the completion of that learning. On the other hand, Robots and 3D printers may be the beginning rather than the end of the learning. While the experiential circle of knowledge and skills which moves from little or no knowledge and skill to an apprentice level to a competence level to an application/rethinking level, ending with a new project is not unique to 3D printing, the approach used here may provide a model for other programs.

**The role of technology in CCLC programs**

As a way of connecting the robotic and 3D printing clubs undertakings with the other club activities, a short discussion of technology is in order. The authors of *How people learn: brain, mind, experience, and school* (Committee on Developments in the Science of Learning, 2001) provide a broad view of the nature and role of technology in education. Many people both inside of and outside of educational circles often narrowly think technology as “fancy” and “flashy” gimmicks. Robots and 3-D printers as detailed above provide a different perspective. Additionally, technology also includes computers, smart phones with educational apps, and the internet as well as older technology such as “old fashion” calculators, and non-computer whiteboards and even ancient Chinese technologies such as the abacus.
The Committee on Developments in the Science of Learning (2001) argue that technologies may (1) bring real-world problems into classroom, (2) provide “scaffolding” support to augment the content and skill acquisition of learners, (3) increase opportunities for students to get feedback from software, tutors, teachers, and peers, (4) to engage in reflection on their own learning processes, (5) to receive guidance toward progressive revisions that improve their learning, (6) building local and global communities of instructors, staff, administrators, students, and parents, and (7) expanding opportunities for teacher learning (p. 243). One word, on the second point above, needs explanation and elaboration – scaffolding. An understanding of scaffolding as an educational concept comes from its use in the building trades, that is, a scaffold is a temporary structure on the outside of a building, made usually of wooden planks and metal poles, used by workers while building, repairing, or cleaning the building. As an educational practice, the goal is to provide a scaffold for a student that gives support as the student is figuring things out. The teacher provides clues and hints, models behavior, or gives examples, and over the course of time, removes those prompts and supports to allow the student to “stand on her own.”

Closely related to scaffolding is the zone of proximal development or ZDP. The ZDP “is the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers” (Vygotsky, 1978, p. 85-86). Using the principle of scaffolding teachers and more able peers aid students in bridge the gap between what can be done with assistance and what will later be accomplished independently. The ZDP is the space created in many of the Clubs
activities as show above in both the 3D section and the Robotic section of this report. The relationship between children and adults is determined by the child’s social space (Cole a cited in Wertsch, 1985, p. 153). A mentor is the personification of the ZDP as she models skills, shows the small steps the student needs to move toward a larger goal, and then pulls away as the student makes progress. The two Clubs using technology began the review of the program highlights not because they are unique examples. All or most of the programs sported by CCLC are in fact consistent with the general timber of the before and after school Clubs and activities as a whole because these programs provide a glimpse into how teachers/instructors intuitively or intentionally use these principles in their implementation of these programs modeling scaffolding and optimizing the learning opportunities embedded in the idea of the ZDP.

**Recommendations**

Everyone has understanding, resources, and interest on which to build. Learning a topic does not begin from knowing nothing to learning that is based entirely on information. Many kinds of learning required transforming existing understanding, especially when one’s understanding needs to be applied in new situations. Teachers have a critical role in assisting learners to engage their understanding, build on learners understanding, correcting misconceptions, and observing and engaging with learners during the process of learning (Committee on Developments in the Science of Learning, 2001, p. 138).

Building on this statement from *How People Learn: Brain, Mind, Experience, and School* (2001) the suggestions that follow include ideas from the work of Carol Dweck on self-
theories of intelligence and rewarding effort over accomplishment, Howard Gardner’s work on educational goals and curriculum ideas, and Jerome Bruner’s work on culture and education (1996). Most importantly, recommendations have as there base three essential characteristics about learners: they all strive for a sense of competence, their own identity, and relationships with others, including teachers, mentors, parents, and peers (Selman, 2003; Ryan & Deci, 2000; Bandura, 2000). These authors along with Erik Erikson, Erich Fromm, and Abraham Maslow argue for these characteristics as being central to human wellbeing, as well as important qualities within the learner.

Richard Ryan and Edward Deci in “Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being” (2000) make a case that competence, autonomy, and relatedness “when satisfied yield enhanced self-motivation and mental health and when thwarted lead to diminished motivation and well-being” (68). As much has been written here already on the development on competence, I will now present some recommendations on the understanding of the role of relationships in and around school as well as some practical suggestions that connect back to and extend existing practices before going back to competence.

Promotion of Social Awareness: Powerful Lessons from the Partnership of Developmental Theory and Classroom Practice

Robert Selman in this long career as a developmental psychologist and a therapist within schools and clinics has developed an appreciation of how we understand our experiences with other people and the world moving as we move from a very personal individualistic perspective to an expansive view that includes the larger society with ourselves as a part of the whole. His work has come together in a series of books
culminating in *The Promotion of Social Awareness: Powerful Lessons from the Partnership of Developmental Theory and Classroom Practice* (2003) as this book provides a detailed overview of how schools can contribute to both the interpersonal growth of students while also working toward the enhancement of the communities the students live in.

Central to Selman’s approach is his theory of interpersonal development, which builds on the basic psychological needs of autonomy, relatedness, and competence presented above. Selman calls this dimension the “interpersonal orientation.” By interpersonal orientation, he means a person’s tendency to accommodate to another’s wishes or to assert his or her own will (p. 37). The goal is to balance one’s need for autonomy with one’s need for relatedness. When these two needs are balanced, one can be said to have reached a sense of social competence.

The interpersonal stages move from level 0 to level 4. Here are the 5 stages: Level 0: Egocentric Role Taking (ages 3–6, roughly), Level 1: Subjective Role Taking (ages 6–8, roughly), Level 2: Self-reflective Role Taking (ages 8–10, roughly), Level 3: Mutual Role Taking (ages 10–12, roughly), Level 4: Societal Role Taking (ages 12–15+, roughly). Two points need to be presented here, (1) the students can learn to act age-appropriately with each stage, and (2) working with kids at opposite ends of the autonomy and relatedness spectrum is a helpful way to work with difficult students.

Selman’s work with schools utilizes class readings and discussion by selecting books that address some of these issues, such as *A Day’s Work* by Eve Bunting. While this is a picture book illustrated by Ronald Himmler, it is intended as a grade three to five class reading assignment. This story and others are a part of the *Voices of love and freedom* curriculum developed for the Boston school system and has a focus on minorities within
the school and community. While the curriculum as a whole may not be appropriate for general use, Selman’s Book *The promotion of social awareness* (2003) is a good source for ideas regarding educational attainment as well as improvement of the school’s culture.

**Motivation, Social Development, and Well-Being**

Richard Ryan and Edward Deci of the University of Rochester have examined motivation as it relates to learning and teaching. These authors are concerned with “how individuals acquire the motivation to carry their goals and how motivation affects persistence, behavioral quality and well-being (2000, p. 71). They argue that it is the intrinsic appeal of the project or a supportive relationship with the instructor that lead to a motivated learning situation. Based on this point, if a before or after school program or club is to succeed, one of two things is essential. Either the activity needs to be intrinsically interesting to the learner or the learner needs to feel attached to the instructor if the activities are not intrinsically motivating. In an ideal situation the project would be intrinsically interesting and the instructors would establish a supportive and nurturing relationship with the learner.

Because extrinsic motivated behaviors are not typically interesting, the primary reason people initiate such forms of action is because the behaviors are prompted, modeled, or valued by significant others to whom they feel (or want to feel) attached or related. This suggests that relatedness, the need to feel belongingness and connectedness with others, is centrally important for internalization [of new learning] (p. 73).
The ideas of Ryan and Deci are at the basis of much that is done in the CCLC programs. This research merely supports what is already being done, but also a more detailed examination of the work of these authors will provide both support, and perhaps some new ideals as to way to make those connections and enhance nurturing relationships. At their best before and after school activities and clubs provide both intrinsic motivating activities and instructors to whom the students connect. It likely has occurred to many readers that Ryan and Deci’s pout about the importance of making connections with students through prompts, modeling, and valuing by significant others is closely connected to Vygotsky’s suggestions regarding scaffolding and the ZPD.

**Carol Dweck and self-theories of intelligence**

Carol Dweck (Stanford University) has researched how people think about their intelligence; how they understand what it means for them to be smart. Her research indicates that students generally fall into two categories. One group tends to think that one is either smart or not so smart and that there is little they or anyone else can do to change that. She calls this group, entity theorist, or says that they have a fixed mindset. The other group looks at intelligence as something that can be improved by hard work. She characterizes this group as incrementalist or as having a growth mindset. Dweck goes on to argue that a person with a growth mindset is more likely to work on challenging problems and to keep at them, while people with a fixed mindset are more likely to seek out easier tasks so they can show how smart they are. The folks with the fixed mindsets are also likely to give up if they do not get the results quickly.

Importantly, Dweck’s research also says hows that a part of the way that students establish their mindset is through the types of encouragement they receive. If the student
is praised for effort “I like how hard you worked of this project” as apposed to praise for ability “You are brilliant” or even “that was a great project” are more likely to develop a fixed mindset. This is not to say that students should never be praised for accomplishment or that they should only be praised for effort, any encouragement is generally a good thing. Dweck’s research does suggest that it is valuable to praise effort as often as possible (Dweck 2000; 2006).

**The School-wide Enrichment Model**

Joseph Renzulli (University of Connecticut) is famous for his work in TAG (Talented and Gifted) programs though recently he has proposed a model for school-wide enrichment that grew out of his work in TAG education. The model presents three types of activities. Each type of activity informs they other two types of activities and flows into the other activities.

Type 1 activities Renzulli calls: *general exploratory activities*. These activities are designed to give a taste of something new that the student might not have been inspired to pursue previously or in any depth.

Type 2 activities, Renzulli calls *training activities*. These might also be called skill building activities as their purpose is to enhance the students’ abilities in a specific area: problem solving, calculating, recall rehearsal, or any of the metacognitive skills.
The third type of activities are *individual and small group investigation of real problems*. Most of the before and after school programs and clubs use type 1 and type 2 activities on a regular basis. Type 3 activities are used less often and with good reason. All learning opportunities do not fit into solving “real world” problems, but to open the possibility of moving type 1 or type 2 activities into a type 3 activities offers some exciting possibilities.

One of the basic needs implicit in the work of Selman and Renzulli is autonomy. Autonomy may be defined as the capacity of an agent to act on his or her own understanding and values rather than under the overly persuasive demand of others. Selman looks to independence and self-assuredness as signs of autonomy. The autonomous learner is a self-activated maker of meaning, an active agent in his own learning process. He is not one to whom things merely happen; he is the one who, by his own volition, causes things to happen. Learning is seen as the result of his own self-initiated interaction with the world, such as a type 3 “real world” project.

The above discussion focused primarily on relatedness and to a lesser degree on autonomy. Autonomy is similar to independence but they are not the same. Autonomous learners think for themselves but often think in the presence of others whose ideas they value. They often have insights into their learning styles and strategies. These learners tend to take an active approach to the learning task at hand. They show a willingness to take the educational risk of being wrong and are willing to revise and reject hypotheses and rules that do not apply. According to Dweck, autonomous learners are likely to have a growth mindset (2000) Both Selman (2003) and Ryan and Deci (2000) use autonomy in this sense.
Pulling together the recommendation

Addressing the basic needs of students, whether they are struggling, very successful, or somewhere in-between is the overall goal of education. While the 21st Century program focuses mostly on the students who are struggling for whatever reason, all solid educational strategies are in some manner based on the reasons compiled in *How people Learn: Brain, Mind, Experience, and School* (Committee on Developments in the Science of learning, 2001). To repeat: Autonomy, competences, and relatedness are key to all learning and intellectual growth.

Lev Vygotsky’s work brings the instructor (teacher, mentor, parent, more competent peer) into a fuller picture of the nature of learning and teaching. A short discussion of scaffolding and the Zone of Proximal Development (ZDP) was presented earlier. Here I wish to connect these Vygotskian ideas with the work of Carol Dweck and Howard Gardner as a way of pulling things together. If one can change one’s understanding of what it means to be intelligent, that is, it one can learn to be either a fixed/entity theorist or growth/incremental theorist of intelligence, then Vygotsky’s theory show us how that may be done. Instructors and mentors provide small steps and models for learning that allows a learner to rise to the next level of mastery. Each small step coupled with prompts and encouragement encourages the student to the next small step. As each step along the way is completed, the students feels a sense of accomplishment and the possibility of seeing that they might develop new knowledge and skills.

Gardner (1999) suggests that we look closely at (1) new and old forms of apprenticeships, (2) direct confrontation with erroneous conceptions, (3) frameworks for
learning that facilitate understanding over memorization, and (4) multiple points of introduction for learning (p. 1999). Apprenticeship, understood broadly, fits neatly into Vygotsky’s scaffolding principles as well as the idea of beginning where the student is. Directly addressing errors has to begin with knowledge of what the student knows or thinks he knows [Key Finding 1 (Committee on the Developments in the Science of Learning, 2000, p 1)]. The frameworks to facilitate learnings begin by re-thinking the learning goals by making them more complex and connected to the local community and the larger world. Individual objectives, however, may remain more narrowly focused. Creating multiple points for learning is at the core of the CCLC programs and clubs.

The recommendations in this report create a narrative for enhancement of work already in progress in the CCLC programs by showing connections between what is, and what might be. These theories, taken together, provide an additional lens that will help of foes on and develop better educational practices.

**Summary**

The CCLC programs are on a solid foundation. These comments are intended to provide some integration of the supportive theories and research upon which these programs are based. The small suggestions in this report are given in hope that they will contribute to the improvement of a well conceived and executed program that has already provided great benefit to the students, the staff, the school, and the community.