Collaborative Learning with 21st Century Learning Environments: Leveraging the Assets of Student Diversity

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California Department of Education
Mission

California will provide a world-class education for all students, from early childhood to adulthood. The Department of Education serves our state by innovating and collaborating with educators, schools, parents, and community partners. Together, as a team, we prepare students to live, work, and thrive in a multicultural, multilingual, and highly connected world.
The California Department of Education envisions school facilities that enhance the achievement of all students and are learner-centered, safe, sustainable, and centers of the community.
Presenter Background

- Former Title I Teacher, Curriculum Specialist, Instructional Reform Facilitator, and Teacher Coach for Title I Schools.
- Advocate for equitable education and environments for diverse students.
- Title I Gifted and Talented Education (GATE) teacher with traditionally underrepresented elementary students. This experience provided inspiration to share and implement similar practices with all Title I and diverse students, including multiple intelligence theory, project based learning, deeper learning, Blooms Taxonomy, constructivism, etc.
- Provider of flexible learning environments on a shoe-string budget and utilizing asset-based philosophies.
- Education Programs Consultant for CDE School Facilities for seven years.
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td>ii</td>
</tr>
<tr>
<td>Dedication</td>
<td>iii</td>
</tr>
<tr>
<td>Chapter</td>
<td></td>
</tr>
<tr>
<td>I. The Problem and its Investigation</td>
<td>1</td>
</tr>
<tr>
<td>II. Review of Related Literature</td>
<td>8</td>
</tr>
<tr>
<td>III. Design of the Guide</td>
<td>21</td>
</tr>
<tr>
<td>IV. Collaborative and Interdisciplinary Learning for Diverse Students</td>
<td>24</td>
</tr>
<tr>
<td>V. Summary, Conclusion, and Recommendations</td>
<td>71</td>
</tr>
<tr>
<td>References</td>
<td>77</td>
</tr>
</tbody>
</table>
What are Asset-Based Philosophies in Education?

Today’s elementary classrooms represent students from many different socioeconomic backgrounds, ethnicities, languages, ability levels, and interests. It is important for students to work together so they can learn about and from each other. Instead of separating students and academic subjects, which limit students’ learning opportunities, teachers can use collaborative learning to enhance students’ learning outcomes. Collaborative learning allows students to use their individual assets while they work together on 21st century learning skills such as collaboration, communication, critical thinking, and problem solving.

When teachers are able to focus on asset-based learning and achievement rather than classroom management and student behavior, Ladson-Billings (2014) found that students take more responsibility and interest in their own education.
Collaborative Learning Methods that Facilitate 21st Century Learning and Leverage the Assets of Diverse Students

- Heterogeneous Grouping
- Collaborative Strategic Reading (CSR)
- Buddy Reading
- Culturally Inclusive Practices

Language arts instruction offers many opportunities for collaboration. Alexander and Van Wyk (2017) found that the use of cooperative learning with culturally diverse students changed the interactions and communication of students while also increasing mastery of learning and social skills.

Findings suggest that promoting multiple languages in the classroom helps students develop empathy for others and for themselves, and assists students in exploring their multiethnic and multilingual identities and communities, instead of hiding them (Brownell, 2017).

- Encourage and promote biliteracy in the classroom
- Perpetuate and foster linguistic, literate, and cultural pluralism
- Consider using “Emergent Bilingual” terms rather than “English Language Learners”
- Affirm student identities, rather than conforming or assimilating
- Tap into the “funds of knowledge” that students’ families have to offer in order to connect homes and classrooms for diverse learners (Moll, et al., 1992)

In addition to affirming identity during language arts instruction, culturally inclusive practices lend themselves well to collaborative learning in diverse classrooms. Several studies have demonstrated that scripted and passive pedagogical practices do a disservice to ELLs because they do not build on the assets from their linguistic and cultural knowledge (Cummins, 2005; Warschauer, Knobel, & Stone, 2004). In addition, when students are able to take charge of their own learning and invest their own identities in their learning experiences, active learning is more likely to happen, (Cummins, 2005; Ladson-Billings, 2014) which is important to collaborative learning.
How 21st Century Learning Environments Support Collaborative Learning

- Interdisciplinary Learning
- Universal Design for Learning (UDL)
- Multi-modal Approaches to Learning
- Technology Integration

Students are experiencing an opportunity gap, due to the lack of equitable access to learning opportunities for minoritized student populations (Chappell & Cahnmann-Taylor, 2013).

Interdisciplinary collaborative units that combine subjects like social studies and the arts with language arts increase student engagement, students' self-concept, and positive attitudes about school (Gardner, Wissick, Schweder, & Canter, 2003; Ritter, 1999; Yorks & Follo, 1993).

UDL provides multiple means of engagement, representation, and action (including technology) to facilitate learners who are purposeful, motivated, resourceful, knowledgeable, and goal-directed (Rao & Torres, 2016).

UDL provides ample opportunities for teachers to design lessons for students from different backgrounds through integration and connection to their cultures, languages, and personal learning preferences (Rao & Torres, 2016).
CAST: Center for Applied Special Technology

CAST has received international recognition for development of innovative approaches to expanding educational opportunities for all individuals based on UDL principals.
Integrate research and best practices on school facilities and learning environments with teacher training and staff development.

Understand the urgent need to involve teachers of linguistically and culturally diverse students because the students are often learning in outdated and inadequate school facilities.

Changes can be made to existing spaces with or without funding, as long as teachers are an integral part of this shift to 21st century learning.

In a study by Tanner (2009) that examined school design in 71 schools focusing on school design classifications of movement and circulation, day lighting, and views, the researcher found significantly positive effects on student scores in language arts, reading vocabulary and comprehension, mathematics, and science on the Iowa Test of Basic Skills (ITBS).
How Educators Can Provide Flexible, Collaborative Learning Environments

- Provide collaborative learning spaces that are flexible and offer good movement and circulation patterns (Tanner, 2009).
- Provide alternative seating arrangements with face-to-face contact, which facilitate inquiry and discourse more than row and column seating (Marx, Fuhrer & Hartig, 1999).
- Enable students to use the resources in the room according to their own choices and needs in groups or individually, accessing materials and digital tools as needed, rather than being confined to rows of seating that can stifle creativity (Wesblat & McClellan, 2017).
Outcomes and Findings from the Self-Organized Learning Environments (SOLE) Study

“The SOLE process creates opportunity for the practice of collaboration, the operationalization of rapid shared synthesis of information, the adaptation and leveraging of new and existing knowledge, and the use of technology for student driven learning and presentations.”

“Acknowledges and uses each person’s assets for collective learning and outcomes; establishes positive social capital, creating a pattern for ongoing use of the collective talent.”

“Asset-Based Learning: Utilizing the assets of the individual and allowing the sum effort to add up to more than each part.”

“Students are connected to learning as individuals, as group members, and as contributors during the SOLE process.”

“Valuing 21st-Century Skills: Rapid adaptability and flexibility of the learner, the teacher, and the system via the use of technology to drive authentic inquiry based learning.”

*The Disruptive Innovation of Self-Organized Learning Environments, Weisblat and McClellan (2017)*
Design Spaces that Promote Development of 21st Century Learning Skills

The Four Cs for Diverse Students

- **Communication**: Communicate effectively in diverse environments that include multilingual and Emergent Bilingual Students, AKA English Language Learners (ELL).
- **Collaboration**: Student-led, inquiry driven, interdisciplinary projects where students work effectively and respectfully with diverse teams.
- **Critical Thinking**: Making decisions, evaluating, risk-taking, flexible thinking, analyzing complex systems.
- **Creativity**: The freedom to decide, student centered learning, visualization, design thinking, open and responsive to diverse perspectives, incorporating group feedback into work.
Design with 21st Century Learning in Mind

- With Common Core State Standards (CCSS), students learn standards and content with greater depth so they are able to use and apply information to real world issues and challenges.
- Students learn to express ideas, work together, and listen carefully to integrate and evaluate information.
- Direct instruction should be minimized but not eliminated.
- Project-based learning enables students to take charge of their own learning (constructivism) and facilitates integration of the arts and other subjects.
- Culturally relevant pedagogy affirms identity in multilingual and multicultural classrooms.
- Utilize community and students’ “Funds of Knowledge” to connect homes and classrooms.
Design with Technology in Mind

- Flexibility with Infrastructure Improvements
- Ability to Integrate the Constant Flow of New Technologies
- One to One Computing/ Hand-held Devices
- Learning Occurs Anytime, Anyplace, Any Path
- Adaptable Spaces
- Extended Learning Areas
- Accommodating Furniture
- Adequate Electrical Charging Stations
- Access to Peripheral Devices
- Secure Electronic Storage

Studies show that the use of educational technology applications can produce positive effects for K-12 disadvantaged student achievement outcomes, when compared to traditional teaching methods, but that teacher training in technology and teachers’ efforts in using classroom technology show even greater promise for student outcomes (Cheung, 2013; Cheung & Slavin, 2012; Kulik, 2003).
Technology Considerations for 21st Century Learning

- One to One Computing/ Hand-held Devices
- Learning Occurs Anytime, Anyplace, Any Path
- Personalized Learning
- Blended Learning
- The Flipped Classroom
- Project Based Learning
- Centers approach to provide access to technology in classroom environments with limited access to technology
Which Furniture Supports Better Collaboration?
In Which Learning Environment is Collaboration More Likely to Occur?
FLEXIBLE LEARNING ENVIRONMENTS

School and classroom designs should facilitate modern learning methods that prepare students for college, career, and citizenship in the twenty-first century. Students are expected to thrive when they learn through problem solving and in-depth demonstration of subject matter. It is essential to move forward in building and equipping California’s school facilities. It is essential to provide flexible learning environments that support teaching and learning needs.

To optimize new and flexibly learning methods, such as project-based learning and personalized instruction, spaces should be adaptable to allow multiple learning activities to occur simultaneously. A flexible classroom is fundamental to an instructor’s ability to adapt to various needs. The design must allow for a variety of learning environments and grouping formats that consider all learning styles.

Learner-centered classrooms should be designed to accommodate different learning and teaching formats, including:

- Individual study and reflection
- One-on-one instruction
- Pair-to-pair discussions
- Small group work
- Teacher-directed instruction
- Student presentation

Students will then construct their own learning and find a way to understand flexibility is through the properties that support constructivist teaching pedagogy.

Flexibility represents the design of space for flows of instructions, sight, sound, and air.

Vesiveness indicates the property of space that allows for multiple uses.

Convertibility designates the ease of adapting educational space for new uses.

Scalability designates a property of space for expansion or contraction.

Modifiability is the spatial property that invites active manipulation and appropriation.

For more information, contact the California Department of Education, School Facilities and Transportation Services Division, at 916-322-2419.

Flexible Furniture

Collaborative learning spaces call for flexible furniture to allow variety and modifiability. Classrooms designed to support active learning increase student engagement on multiple measures, as compared to traditional row-by-column classroom seating.

Technology needs to be co-designed into its space with a focus on the needs of all learners.

Flexible schools also provide space outside the classroom for collaborative learning, such as:

- Learning studios
- Desktops, flexible furniture, and space for group projects
- Open areas, such as artrooms and music rooms
- Project spaces
- Art rooms
- Music and band rooms
- Multipurpose rooms
- Library rooms
- Lab spaces
- CAFAs
- Outdoor learning
- Access to community service projects and community centers
- Access to nature, social, emotional, and physical benefits for students.

Chabot College has a state-of-the-art flexible classroom environment and a mobile furniture system that allows for easy reconfiguration.

Implementing Flexibility in schools can be challenging, but with the right furniture configurations, a smaller classroom has room for flexibility when row-by-column classroom seating is insufficient.

Flexible Design

In learning environments that are designed for flexibility, students may be observed learning while laying down on the carpet or sitting at tall tables, on soft seating, or in sitting chairs. Students may work alone or in groups. Areas with screens or glass partitions allow for the instructor to have privacy to do the various activities occurring simultaneously.

Innovative school designs incorporate sliding or folding doors and movable interior walls that allow linked classrooms to work in common areas or on outdoor learning projects. Shared learning spaces foster a sense of community as students work in teams for 3D animation, science, technology, engineering, and mathematics, career education, technical education, and other subjects.

Flexible learning spaces are affordable for existing school facilities, as well as in new and new construction projects. Today, students require environments that encourage discovery and deeper learning, and flexible design is fundamental to the next generation of learning and teaching.

4.iac: The Flexible Classroom Approach to Support Inclusiveness and Learner Engagement (September 2019).
8. ic: The Flexible Classroom Approach to Support Inclusiveness and Learner Engagement (September 2019).
SCHOOL FACILITIES AND TECHNOLOGY INTEGRATION

Studies have shown that the use of technology in the K-12 education system can enhance student learning and achievement. Technology tools can help teachers as facilitators who are focused on meeting the needs of individual students with different learning styles. Technology use can promote development of twenty-first-century skills, such as communication, collaboration, critical thinking, and allows access to resources for students.

Recent trends in technology for K-12 education include wireless networks with Internet access anywhere and at any time, one-to-one computing for students with small handheld devices and tablets, individualized learning, electronic assessments, audio-visual enhancement systems, document cameras, interactive whiteboards, large-screen displays and projectors, and classroom technology that replicates centralized computer labs. The ability to offer classes online and the use of teleconferencing in hybrid facilities (combining Web-based and brick-and-mortar spaces) are appearing to be more prevalent.

These and other applications of technology should not be considered isolated in independent of the learning spaces and curriculum. They should be part of the early design process driven by educational specifications. The California Department of Education offers a variety of resources to help schools and districts integrate technology with teaching and learning.

New construction and renovation of existing school facilities should be approached with the understanding that technology and its applications are advancing. Flexibility with infrastructure improvements will allow for future adaptation as the use of classroom technology is expected to increase over time.

There are many potential applications of technology that have facility design implications. Here are a few examples to consider:

Adaptable Spaces: The traditional blocks of identical rectangular classrooms can be transformed to flexible spaces that are different shapes and sizes, interconnected, and allow for shared resource areas. This design change will lead to learning spaces that also resemble both large- and small-group instruction. Students can learn to collaborate more effectively either in small and large-group instruction and allow learners to alternate quickly between teacher lecture, project-based learning, and independent work. The use of technology can be enhanced by mobile furniture, breakout spaces, openable walls, windows, partitions, and comfortable spaces where students can work while under supervision.

Extended Learning Areas: Wireless networks and handheld portable devices enable the potential to transform nonclassroom spaces into extended learning areas. Common areas, outdoor areas, and off-campus areas may be used for science experiments, fieldwork, and project-based learning.

Accommodating Furniture: For various types of teaching and learning to take place, furniture must be easily repositioned and stacked or small spaces, enabling movement among students and teachers. Moveable-casework can provide convenient access to technology, lab supplies, and research materials. Individual student desks may be replaced by work surfaces and rolling chairs that are comfortable for sitting or standing.

Electronic Storage: As electronic textbooks complement printed textbooks, the space previously allocated for book storage decreases. However, secure storage is essential for expanding technology tools and software for substantial amounts of electronic file storage.

Acoustics: Moveable and sound attenuating walls can prevent disruption to surrounding learning spaces and can accommodate twenty-first-century learning such as video conferencing, virtual classrooms, and personal instruction.

Technology affects many areas of twenty-first-century learning. Including career technical education, blended learning, STEM (science, technology, engineering, and math) learning, physical education, school security, energy conservation, assessment technology for special education, professional development, weather and pest management, grading, and more. School facilities can be adapted by modifying or modernizing current learning spaces in order to benefit from the technological advances available to education today and in the future.

Electrical Outlets/Charging Stations: Overcrowding that uses a variety of technology tools and interactive computing increase the necessity for access to power. Electrical outlets are commonly found on the perimetric walls, but in some cases it may be advantageous to integrate power sources into floors, ceilings, and furniture. Mobile charging and storage stations may also be needed to secure electronic devices on campus.

Lighting Controls: A variety of visual displays in one learning space often calls for accessible lighting controls that allow quick and easy increase or decrease of light. Lighting controls can allow the room to have separate areas with different light levels. The effects of glare on a screen may also influence the relative location of the window and doors and the need for shading and glare-reducing designs.

Access to Peripheral Devices: An equipment vendor and present content in multiple formats, the need for easy access to devices increases. Students will frequently use printers, projectors, monitors, scanners, cameras, copiers, and other devices. These tools will be linked to each classroom or to adjacent shared resources rooms. Each will require space, access, connectivity, power, security, and structural mounting or easy means of mobility.

For more information, contact the California Department of Education, School Facilities and Transportation Services Division, at 916-322-2019.

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Educational Specifications

- Educational Specifications are interrelated statements that communicate what educators believe is required to support a specific educational program.

- Ed Specs use words to allow the architect to visualize the educational activity to be conducted.

- Example for an elementary school: “Classroom instruction will use project-based activities to reinforce lecture. Technology will be used to supplement teacher provided instruction.”

The CDE provides summaries of research that demonstrate the link between school facilities and student achievement and the positive impact on:

- Test Scores
- Attendance and Suspension Rates
- Behavior
- Graduation Rates
- Health and Wellness

**Earthman, 2002**
Students who receive instruction in buildings with good environmental conditions can earn test scores that are 5-17 percent higher than scores for students in substandard buildings.

**Heschong Mahone Group, 1999**

**Boyce, 2004**
Studies indicate that student performance is improved by an even distribution of daylight, an expansive view, and limited glare and thermal heat gain. One study found 20 percent faster student progress on math and 26 percent faster progress in reading compared with students in classrooms with less exposure to daylight.

**Harner, 1974**
Students’ reading speed, comprehension, and mathematics performance are adversely affected by room temperatures above 74 degrees.
Studies indicate that student performance is improved by an even distribution of daylight, an expansive view, and limited glare and thermal heat gain. One study found 20 percent faster student progress on math and 26 percent faster progress in reading compared with students in classrooms with less exposure to daylight.

(Rensselaer Polytechnic Institute, 2004; Heschong Mahone Group, 1999)
Daylighting

Skylights
Clerestories
Solar Tubes
Transom Windows
Light Shelf Apertures
or..... just open the curtains!

Dover Elementary School Library
West Contra Costa Unified School District

High Tech Charter, San Diego
School Facilities Improve Learning

There is a growing body of research demonstrating that clean, safe, and well-maintained schools can have a positive impact on student achievement. Schools that provide a safe and healthy environment for students can improve student performance and engagement, reduce behavior problems, and increase academic achievement.

Students who receive instruction in buildings with good environmental conditions can earn test scores that are 3-17 percent higher than those for students in substandard buildings.2

There is a negative relationship between classroom noise levels higher than 40 decibels and student achievement.3

Schools with better building conditions have up to 14 percent lower student suspension rates.4

Improving a school’s “Overall Compliance Rating,” to meet health and safety standards can lead to a 30 percent decrease in California Academic Performance Index scores.5

Substandard physical environments are strongly associated with teacher and other behavior problems in students. Lower student attendance rates to these scores are based on tests in English-language arts and math.6

Sustainable Schools Improve Learning and the Environment

The recent National Action Plan for Greening America’s Schools suggests that a sustainable school creates a healthy environment that supports the learning and well-being of students, faculty, and staff. In addition, sustainable schools can improve student performance and engagement, reduce behavior problems, and increase academic achievement.

One study showed that sustainable schools have 33 percent less energy and 33 percent less water consumption compared to conventional schools, significantly reducing utility costs over the average 40-year life cycle of a school.7

Additional studies show the following benefits for energy and water savings. According to a national survey from 2008, the median annual cost for energy and utilities per student in buildings with high-performance, green design was $290.12.

Improving a school’s health and safety standards can lead to a 30 percent decrease in California Academic Performance Index scores.8

The environmental impacts of pollution, climate change, and other environmental problems are strongly associated with health and safety problems in students. Lower student attendance rates to these scores are based on tests in English-language arts and math and are in the running.

Studies indicate that student performance is improved by an increased availability of daylight, an improved view of the outdoor environment, and increased opportunities for social interaction.9

A school’s ability to effectively use construction techniques can reduce stress, and the use between 50 percent and 70 percent of building materials such as brick, glass, wood, metal, paint, and gypsym.10

Notes
2. Ibid.
7. Ibid.
8. Ibid.
9. Ibid.
10. Ibid.

References
2. Ibid.
6. Ibid.
7. Ibid.
8. Ibid.

For more information, contact the California Department of Education, School Facilities Services Division, at (916) 322-4276.
CDE School Facilities
Summaries of Research

Schools as Centers of Community
Improve Learning

Many recent documents support the concept that schools are centers of community. Research shows that the concept boosts student achievement and fosters community life. Some reports also advocate the fiscal soundness of the concept and others point to the environmental advantages ofLE.

- Improved student academic performance
- Improved attendance
- Improved graduation rates
- Reduced dropout rates
- Reduced behavioral/discipline problems
- Increased access to physical and mental health services

Here are reasons to consider building schools that function as centers of community:

- The U.S. Environmental Protection Agency (EPA) views schools as the key to promoting economic development, strengthening neighborhoods, and improving human and environmental health.
- According to the EPA, a centrally located school with sidewalks and safe walking and biking routes can reduce air pollution and promote other healthy community benefits, such as joint-use arrangements.

- Schools that function as centers of community may open up or longer the community use—or they may be designed to promote community with other entities such as a public library, performing arts center, fine arts centers, senior centers, health clinics, community college branch, sports stadium, public park, or museum.
- Location is a concept according to which public services are placed together in one location. The benefits are cost savings and community support for the tax increases required to repay school construction bonds.
- Many perceived obstacles to joint use can be overcome with agreements between agency groups that typically function in "silos." The cost benefits to communities can be substantial.

Notes

Safe Schools Foster Improved Student Learning

Everyone wants safe schools for their children. Current research shows that the definition of "safe" involves three areas that school facilities planning groups should consider:

- Physical plant hazards
- Environmental conditions of the site and of the building
- Crime/harassment prevention

- Some research findings and resources are provided below:

- The California Department of Education provides a guide to help districts review current health and safety requirements. The guide identifies potential physical hazards and environmental safety conditions, such as proximity to riparian areas, transmission lines, schools, waste disposal sites, and property lines.
- The U.S. Environmental Protection Agency (EPA) has developed a guide to help schools improve health and safety conditions in the school environment.
- Concern about traffic and street crossings is among the most commonly cited reasons parents do not let their children walk to school or engage in free play in the area.
- Several schools have determined that children suffer significant health consequences from excessive heat, inadequate heating, ventilation, and air-conditioning systems; mold and other biological hazards; pesticide residues; lead and other toxic hazards; and overcrowding beyond the rated capacity of the school building.
- Research repeatedly shows the detrimental impact of high levels of lead and poor indoor air quality in classrooms.

Notes
Self Organized Learning Environment (SOLE) Example

Research: The Disruptive Innovation of Self-Organized Learning Environments (2017) by Weisblat and McClellan

Peter Burnett Elementary Title I School
Sacramento, 1998
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To access the link to the literature review and full text of thesis visit:
https://mollystitt.weebly.com/
https://padlet.com/mollyms/learning_environments_guidance

CDE Best Practices and Resources Fact Sheets
https://www.cde.ca.gov/ls/fa/bp/
# TABLE OF CONTENTS

Abstract ............................................................................................................................................... ii

Dedication ........................................................................................................................................ iii

Chapter

I. The Problem and its Investigation ......................................................................................... 1
   Statement of the Problem ........................................................................................................... 2
   Rationale .................................................................................................................................... 3
   Assumptions and Limitations .................................................................................................... 5
   Definition of Important Terms .................................................................................................. 6
   Organization of Remainder of Paper ....................................................................................... 7

II. Review of Related Literature................................................................................................. 8
   Collaborative Learning Methods that Facilitate 21st Century Learning.............................. 9
   How 21st Century Learning Environments Support Collaborative Learning ................. 14
   How Educators can Design Flexible Collaborative Learning Environments...................... 16
   Discussion .................................................................................................................................. 19

III. Design of the Guide ............................................................................................................... 21
   Organization ............................................................................................................................ 21
   Sources of Activities and Materials ....................................................................................... 21
   Criteria Applied to the Selection of Activities and Materials .............................................. 22

IV. Collaborative and Interdisciplinary Learning for Diverse Students in 21st Century Learning Environments: A Guidebook for Teachers and Administrators ........................................................................... 24

V. Summary, Conclusion, and Recommendations .................................................................. 71
   Summary .................................................................................................................................. 71
   Conclusions .............................................................................................................................. 73
   Recommendations ................................................................................................................... 74
   References ............................................................................................................................... 77
The Universal Design for Learning Guidelines by CAST- Until learning has no limits
http://udlguidelines.cast.org

<table>
<thead>
<tr>
<th>Provide Multiple Means of Engagement</th>
<th>Provide Multiple Means of Representation</th>
<th>Provide Multiple Means of Action and Expression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affective Networks</td>
<td>Recognition Networks</td>
<td>Strategic Networks</td>
</tr>
<tr>
<td>The “WHY” of Learning</td>
<td>The “WHAT” of Learning</td>
<td>The “HOW” of learning</td>
</tr>
</tbody>
</table>

Provide options for

Recruiting Interest
Optimize individual choice and autonomy.
Optimize relevance, value, and authenticity.
Minimize threats and distractions.

Sustaining Effort and Persistence
Heighten salience of goals and objectives.
Vary demands and resources to optimize challenge.
Foster collaboration and community.
Increase mastery-oriented feedback.

Self-Regulation
Promote expectations and beliefs that optimize motivation.
Facilitate personal coping skills and strategies.
Develop self-assessment and reflection.

Goal: Expert learners who are...

Purposeful and Motivated

Provide options for

Perception
Offer ways of customizing the display of information.
Offer alternatives for auditory and visual information.

Language and Symbols
Clarify vocabulary and symbols.
Clarify syntax and structure.
Support decoding of text, mathematical notation, and symbols.
Promote understanding across languages.
Illustrate through multiple media.

Comprehension
Activate or supply background knowledge.
Highlight patterns, critical features, big ideas, and relationships.
Guide information processing and visualization.
Maximize transfer and generalization.

Goal: Expert learners who are...

Resourceful and Knowledgeable

Goal: Expert learners who are...

Strategic and Goal-Directed

Provide options for

Physical Action
Vary the methods for response and navigation.
Optimize access to tools and assistive technologies.

Expression and Communication
Use multiple media for communication.
Use multiple tools for construction and composition.
Build fluencies with graduated levels of support for practice and performance.

Executive Functions
Guide appropriate goal-setting.
Support planning and strategy development.
Facilitate managing information and resources.
Enhance capacity for monitoring progress.

Goal: Expert learners who are...