Strength-Based ICT Design Supporting Individuals with Autism

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A strength-based (SB) perspective assumes that communities and individuals are **resilient**, **creative**, and possess a **deep self-knowing** which informs solutions.

INTRODUCTION

How are Information Communication Technologies (ICTs) developed to support the strengths of individuals with autism?

DEFINITIONS

Autism (ASD) - A neurodevelopmental difference characterized by atypical cognitive processes and atypical socio-communicative behaviors.

Typically Developing (TD) - The most common development pathways seen in children.

Normocentrism - The biased assumption that TD is better than neurodivergence or altered ability.

Heterogeneity - The quality of being diverse in nature, not the same. The ASD population is noted for extreme heterogeneity between individuals.

Strength - Particular abilities that are inherent, not learned, which may or may not be obvious.

Generalization - In Psychology, the ability to apply something learned to analogous or similar situations. This is a particular challenge in ASD interventions and therapies.

METHODOLOGY

Exploratory Search
Platform: Google Scholar
"SB tech development for ASD"
9 essays selected
Results gave a sense of language & research landscape

Supplemental Search
Database: WWU's OneSearch
4 search strings: (i) strength-based AND autism, (ii) autism AND technology, (iii) Autism AND thriving, and (iv) autism AND strength
7 essays selected

Citations traced
5 essays selected
Essays expanded on specific areas of research

Coding & analysis
Total selection: 21 essays
Each was read & coded by a team member. Three team members met and organized information into themes through a thematic analysis.

Selection criteria:
- Published 2008 or after
- Provides diversity in SB perspectives in psychology or ICT development
- Represents interests of autistic community
- Privilege given to community-based models and interdisciplinary approaches

Three *interdependent* themes emerged through our thematic analysis.

FINDINGS

Theme 1
Validate Autistic Intelligence

Persons with autism will always run on autistic neuropathways, regardless of normocentric conditioning.

This is like running software on a Linux system instead of Windows. Creating programs native to the platform results in better performance – though some programs may work on both systems. Understanding the difference, and how each is specialized, is important to utilizing the system to the full extent of its potential.

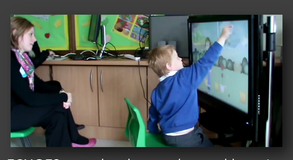
Individuals with autism tend toward enhanced sensory processing, a strength, and specialized interests, an engagement opportunity. Design to utilize these strengths and engagement opportunities, removing counter-intuitive stressors.

Communication differences are a primary issue confronting the autistic population. Members of the autistic community certainly desire to be heard and understood, even if their communication-orientation looks different. Technology can scaffold communication between ASD and TD populations, supporting natural autistic communication-orientation and affinity with technology, a common strength.

Example

ECHOES was developed through adapted participatory design (PD) approaches locating features of an interface which worked well with both TD and ASD children.

Visual feedback and the interaction between annotation tool & participants was important for user learning and engagement.



ECHOES, a technology-enhanced learning (TEL) environment which teaches social skills
Source: https://www.ucl.ac.uk/ioe/research-projects/2018/oct/echoes-project

This project demonstrates support of enhanced sensory processing to engage users through natural strengths without conditioning being necessary.

Theme 2
Autism-specific Measurements of Ability

Appropriate measures of ability are necessary for relevant analysis.

By validating autistic intelligence (theme 1) and using unique cognitive, sociocommunicative, and behavioral attributes as a rule of measurement, we have a different way of developing and measuring success and goals that is more relevant to the subject.

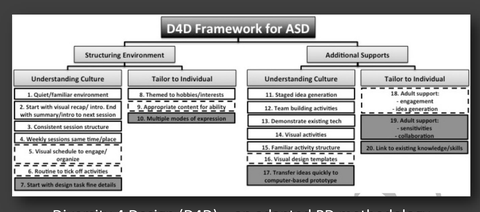
TD cognition and behaviors are used as the golden standard of health measurement in every dimension. This doesn't acknowledge or support autistic intelligence, underestimating neurodivergence and creating a situation where people with autism will always be considered abnormal and pathologized.

More relevant design and goal-setting supports generalization potential as tasks make sense in autistic logic rather using conditioning to teach performative behaviors.

Embedded access to user data and analysis presents an opportunity to better engage users with autism while assessing abilities, user preferences, behaviors, and information processing.

Example

D4D was used to determine which aspects of a game interface were most prominent for the user - utilizing enhanced sensory processing in visual design through a visual calendar.



Diversity 4 Design (D4D) – an adapted PD methodology highlighting an SB approach which empowers and includes the expertise of users. [4]

Collaborative design methodologies and embedded access provide insight into user experience, how autistic intelligence operates, generalization, and can inform more engaging technology design.

Theme 3
Wellbeing is the Outcome Goal

Promotion of wellbeing and natural orientation result in the most desirable outcomes.

Creating an environment for individuals with autism to explore their interests, understand and satisfy their drive toward certain types of information, and exhibit unique skills and learning potentially reveals abilities and skills previously obscured by conditioning or misconception.

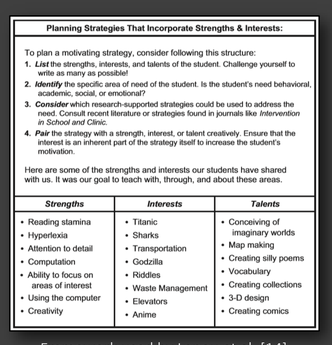
Many common approaches to ASD therapies, interventions, and support pathologize autistic intelligence. This discourages a positive self-identity, undermining confidence and the freedom and safety to take risks in learning. Imagine your every action being monitored. Would you be excited to learn?

Validating autistic intelligence (theme 1) locates doorways to development of communication and other skills inaccessible without a sense of control, wellbeing, and personal value. I*n fact, Mottron et al. found implications that personal wellbeing and satisfaction of idiosyncrasies facilitates access to a vaster array of focus and ability.*

Technology designed for enhanced sensory perception and autistic communication-orientation would be more engaging, promote satisfaction, and make more sense to users thus encouraging generalization of learned skills and a reduction in captive stress-induced behaviors.

Example

Lanou et al. adapt therapeutic strategies with the strengths and interests of children with autism as an intervention. They found these highly individualized strategies support the children, resulting in incredibly successful outcomes. This indicates that personalization and customization centering the individual user's experience is highly effective - and that problematic behaviors can be harnessed as strengths.



Planning Strategies That Incorporate Strengths & Interests:

To plan a motivating strategy, consider following this structure:

1. ***List*** the strengths, interests, and talents of the student. Challenge yourself to write as many as possible!
2. ***Identify*** the specific area of need of the student. Is the student's need behavioral, academic, social, or emotional?
3. ***Consider*** which research-supported strategies could be used to address the need. Consult recent literature or strategies found in journals like *Intervention in School and Clinic.*
4. ***Pair*** the strategy with a strength, interest, or talent creatively. Ensure that the interest is an inherent part of the strategy itself to increase the student's motivation.

Here are some of the strengths and interests our students have shared with us. It was our goal to teach with, through, and about these areas.

Strengths	*Interests*	*Talents*
• Reading stamina • Hyperlexia • Attention to detail • Computation • Ability to focus on areas of interest • Using the computer • Creativity	• Titanic • Sharks • Transportation • Godzilla • Riddles • Waste Management • Elevators • Anime	• Conceiving of imaginary worlds • Map making • Creating silly poems • Vocabulary • Creating collections • 3-D design • Creating comics

Framework used by Lanou et al. [14]

IMPLICATIONS

Methodologies Matter!

SB design and development projects often use some kind of collaborative method or youth empowerment strategy adapted to apply to the user group.

Participatory Design (PD) is a particular method which actively & iteratively includes stakeholders. It is sensitive to the needs, interests, & character of the shareholders, highlighting their voices & contributions.

Sociocommunication styles which create highly attuned and safe environments for individuals with autism dominate SB methodologies. Often, sociocommunicative aspects of the design or process are just as important - if not more - than the resulting technology. Parallel play, a vital part of autistic learning, is promoted through these approaches.

Removing failure promotes risk taking behaviors & offers opportunities to practice & prove ability or accomplishment, key attributes of learning.

Supporting strengths such as affinity with tech, individual communication styles, & enhanced sensory processing - & by utilizing these Design Implications supported by these Themes - creates a scaffold for communication, exploration, & encourages generalization.

Embedded access & **user data** can serve to provide more intuitive & personal experiences, understand user behavior & cognition, & customize tech to suite a variety of uses from entertainment to therapeutic.

CHALLENGES: Because of the early and theoretical stages of SB approaches, most of this research involves *developing* PD approaches rather than implementing goal-specific ICTs. Direct application and development for specific productivity outcomes requires much more involvement with the autistic community to determine how to support real strengths.

ICT Design Implications

Simple Interface
⇒ Accessibility
⇒ Remove failure to boost user's risk-taking and confidence
⇒ Easily discoverable and usable signifiers focus on ability

Complex Functionality
⇒ Remove failure by designing with lots of choices and options, eliminating binary right/wrong actions
⇒ Provide variety and user-driven complexity

Customization & Personalization
⇒ Design for diversity, featuring person-centered flexibility, and appropriate options and interface complexity

Sensory-based Design
⇒ Visual and auditory feedback interact with specialized sensory processing
⇒ Multiple indicator types access different sensory specialties

Predictability & Consistency
⇒ Reduce stress and satisfy expectations
⇒ Stay within change threshold of users
⇒ Design smooth functionality accessible on common devices

FURTURE RESEARCH

CURRENT RESEARCH: This body of research was general and shallow, suitable for the exploratory project it is designed to be. In response to our findings, we have executed an in-depth literature analysis specifically targeting strength-based technology research and design supporting individuals with autism.

FINDINGS: We have substantiated and expanded much of the information presented above. Additionally, there is a clear lack of representation of individuals who are teens or adults, non-male-bodied, minimally-verbal, and/or from non-Western countries/cultures. A literature review report from this team is forthcoming.

FUTURE CONTRIBUTIONS: The authors observe SB approaches in ICT development for individuals with autism is an early, emerging area in technology research and development. Further research with any group is potentially contributive. However, we specifically highlight a need for more focus on the following groups and topics:

- mixed-groups encompassing various neurodivergent and TD populations, including heterogenous groups of individuals with autism
- ability-focused design
- diversity in gender and race
- older individuals with autism
- alter-oriented communication styles including minimally-/non-verbal
- larger sample sizes incorporating more diversity in culture, class, and origin

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