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CONTENT AREA NO 4B
WORK AIDS AND ASSISTIVE TECHNOLOGY

Project Title
Ergonomic workplace design for workers with disabilities and their long-term employment

Project Acronym: **ERGOART**

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Lesson information

Description of content area

This module introduces students to the role of work aids and assistive technologies in creating inclusive and accessible work environments. It emphasizes how technological solutions—ranging from simple tools like pencil holders to advanced systems like eye-tracking devices and AI-powered communication aids—can enhance the functional capabilities of individuals with disabilities. Students will explore the classification, application, and benefits of assistive technologies in improving independence, safety, and job performance. The module also covers current trends, such as the integration of smart wearables, machine learning, and personalized adaptive devices, along with global disparities in access to assistive products. Special focus is placed on designing inclusive workplaces that meet diverse physical, cognitive, and sensory needs.

Learning outcomes

- Attitudes:
  - Commitment to creating inclusive, accessible, and supportive work environments for individuals with disabilities.
  - Recognition of the value of assistive technology in promoting equity, participation, and independence.
- Knowledge and Understanding:
  - Understanding the categories, functions, and applications of work aids and assistive technologies.
  - Awareness of how assistive technologies contribute to improved performance, communication, and well-being.
  - Familiarity with challenges in global access to assistive products and strategies for promoting inclusion.

Terms

Accessibility – extent to which products, systems, services, environments, and facilities can be used by people from a population with the widest range of characteristics and capabilities to achieve a specified goal in a specified context of use.

Adaptive Equipment – tools or devices specifically modified or designed to assist individuals in performing activities of daily living or work-related tasks.

Assistive Technology – any item, piece of equipment, software program, or product system used to increase, maintain, or improve the functional capabilities of individuals with disabilities.

Augmentative and Alternative Communication (AAC) – methods, devices, or systems used to support or replace spoken or written communication for individuals with speech or language impairments.

Environmental Control Unit (ECU) – a type of assistive technology that enables individuals with physical disabilities to control various aspects of their environment, such as lights, appliances, or computers, through alternative input methods.

Eye-Tracking Device – assistive technology that allows individuals to control a computer or communication system using only their eye movements.

Human-centred design – approach to systems design and development that focuses on the needs, preferences, and limitations of end-users, applying ergonomics and usability knowledge and techniques.

Inclusive Design – design approach that considers the full range of human diversity—such as ability, language, culture, gender, and age—to create products and environments that are usable by all people.

Independent Living – the ability of individuals with disabilities to make choices and control their own lives, supported by accessible environments and assistive technologies.

Induction Loop System – an assistive listening system that transmits sound directly to hearing aids equipped with telecoils, improving speech intelligibility in noisy environments.

Sip-and-Puff Switch – input device used by individuals with severe mobility impairments, operated by sipping or puffing air through a tube to send commands to assistive technologies.

Smart Assistive Technology – emerging class of assistive devices enhanced by AI or machine learning to provide personalized, context-aware support to users with disabilities.

Usability – extent to which a system, product, or service can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use.

Work Aid – a device or modification that assists workers in performing tasks more effectively, particularly those with physical, sensory, or cognitive limitations.

Necessary or additional reading

ISO 9999:2022 – *Assistive products for persons with disability – Classification and terminology.*- Provides a standardized framework for classifying and describing assistive products, facilitating communication, procurement, and international comparability.

ISO 21802:2019 – *Assistive products – Guidelines on cognitive accessibility – Daily time management.*

Focuses on assistive products designed to support users with cognitive impairments in managing time, routines, and daily activities.

ISO 21801-1:2020 – *Cognitive accessibility – Part 1: General guidelines.* Describes principles for developing products and services that are cognitively accessible, including assistive technologies and interfaces.

WHO & UNICEF (2022) – Global Report on Assistive Technology. A comprehensive overview of global needs, access, equity challenges, and recommendations for improving the availability and affordability of assistive technologies worldwide. - https://iris.who.int/bitstream/handle/10665/354357/9789240049451-eng.pdf

Questions for discussion and/or self-assessment

1. What is assistive technology, and how does it support inclusion in the workplace and daily life?
2. How can assistive technologies empower individuals with disabilities to participate more fully in education, employment, and society?
3. What are the key categories of assistive technology (e.g., mobility, communication, sensory), and how do they address different types of impairments?
4. In what ways do assistive technologies reduce caregiver burden and improve the quality of life for both users and support networks?
5. What barriers (economic, social, regulatory) limit access to assistive technologies globally, and how can these be addressed?
6. How has the COVID-19 pandemic influenced the adoption and importance of assistive technologies in the workplace?
7. What are some examples of AI-powered or smart assistive technologies, and what benefits and challenges do they present?
8. How do Augmentative and Alternative Communication (AAC) tools enable effective participation in professional roles?
9. How should workplaces assess individual needs to implement appropriate assistive solutions?
10. What ethical considerations arise when selecting or recommending assistive technologies for workers?

Introduction

Humans have always used tools and technology to overcome limitations and improve their quality of life. From basic hand tools to advanced digital systems, our ability to design solutions that expand what we can do has defined our evolution. One of the most impactful applications of this innovation is assistive technology—tools, devices, and systems that support individuals with disabilities in participating fully in everyday life. While all humans adapt their environment, assistive technologies are specifically created to level the playing field. Whether it's a child using a communication device to express thoughts, an adult using a powered wheelchair to move independently, or a worker using adaptive software to perform a cognitive task, these tools reflect a human-centered approach to design. They extend beyond functionality—promoting dignity, inclusion, and autonomy.

Unlike general-purpose tools, assistive technologies are deeply personalized. They address physical, sensory, and cognitive limitations, empowering users to live independently, pursue education, engage in meaningful work, and interact with others on equal terms. This makes them not only practical innovations, but also instruments of social justice and inclusion. Globally, however, access to assistive technology remains highly unequal. While high-income countries provide a wide array of advanced devices, people in many regions lack even the most basic aids. Bridging this gap requires a systemic commitment to equitable design, inclusive policy, and sustainable development.

By understanding assistive technology through the lens of ergonomics and human-centered design, we recognize its potential not only to meet individual needs, but also to reshape society to be more

inclusive. This content area explores how these tools are developed, used, and evaluated—and how they can transform workplaces and lives alike.

1. Work Aids and Assistive Technology

1.1. What are Work Aids and Assistive Technology?

Work aids and assistive technologies refer to tools, devices, systems, or software designed to support individuals—particularly those with disabilities—in performing tasks more independently, safely, and effectively. These technologies range from low-tech solutions like pencil holders or communication boards to advanced innovations such as eye-tracking systems, voice-to-text software, or AI-powered mobility devices.

Assistive technology can take many forms:

- Low-tech: simple, non-electronic tools (e.g., canes, grip aids, or visual schedules).
- High-tech: complex, digital solutions (e.g., speech-generating devices or robotic exoskeletons).
- Hardware: physical items such as wheelchairs, prosthetics, and ergonomic tools.
- Software: screen readers, communication apps, and specialized educational programs.

The main goal of assistive technology is to enhance functional abilities, reduce barriers, and promote participation in education, work, and daily life. These technologies are tailored to individual needs and enable people who experience challenges with mobility, communication, vision, hearing, or cognition to engage more fully in society.

Work aids and assistive technologies are not only essential for users—they also benefit caregivers, educators, employers, and society at large by fostering greater inclusion, reducing dependency, and increasing efficiency. In a broader context, they embody the principles of human-centered design by adapting tools and environments to people's diverse needs rather than expecting people to adapt to inflexible systems.

1.2. Work Aids and Assistive Technology Purposes

The main goal of assistive technology is to enhance functional abilities, reduce barriers, and promote participation in education, work, and daily life. Tailored to individual needs, these technologies support people experiencing challenges with mobility, communication, vision, hearing, or cognition, enabling them to engage more fully in society. By improving how individuals—particularly those with disabilities—interact with their environment, tools, and tasks, assistive technologies foster greater independence, safety, and dignity in everyday living, learning, and working.

These technologies goals are:

- Make tasks more accessible and achievable, even when physical, sensory, or cognitive limitations exist.
- Ensure tools and equipment are adapted to individual abilities and needs, rather than expecting people to adapt to standard environments.

- Improve communication, mobility, and daily functioning, enabling meaningful engagement in work, education, and community life.

To be effective, assistive technologies must account for:

- The function the device is intended to support (e.g., communication, mobility, task execution).
- The user's abilities and limitations, including motor skills, sensory processing, and cognitive capacity.
- The specific tasks users need to perform and how technology will support them.
- Environmental context, such as noise, space, light, or accessibility of physical infrastructure.
- Barriers and constraints, including economic, social, or technical limitations.
- Long-term usability and adaptability, as user needs or conditions may change over time.

By addressing these elements, assistive technologies and work aids provide personalized, effective, and sustainable solutions—empowering individuals to reach their full potential while promoting inclusive and human-centered design across systems.

Work aids and assistive technologies are not only essential for users—they also benefit caregivers, educators, employers, and society at large by fostering greater inclusion, reducing dependency, and increasing efficiency. In a broader context, they embody the principles of human-centered design by adapting tools and environments to people's diverse needs rather than expecting people to adapt to inflexible systems..

2. Work Aids and Assistive Technology – knowledge frames.

2.1. Dynamic and evolving nature of assistive technologies

Assistive technologies (AT) and work aids are not static solutions—they continuously evolve in response to technological innovation, changes in user needs, and growing societal awareness around disability inclusion. From simple, mechanical aids to complex, AI-powered systems, the field of assistive technology is expanding rapidly.

New developments include:

- Eye-tracking communication tools
- Smart gloves for rehabilitation
- Wearable navigation devices
- AI-based hearing aids and visual recognition tools

As needs shift—due to aging populations, changing workplace demands, or user feedback—products must be regularly updated, personalized, and adapted. This evolving nature requires that both users and professionals stay informed about new options and be open to re-evaluating existing solutions.

This also means that the selection and implementation of AT should never be “one and done.” Employers, educators, and users must embrace **flexibility**, **continuous learning**, and **lifelong adaptation** to ensure that technologies remain relevant and empowering.

2.2. What every employer should know when hiring or supporting a person using assistive technology

Employers play a key role in enabling successful and inclusive employment for individuals using assistive technologies. While many devices are personal (e.g. a communication tablet or prosthetic limb), others interact directly with the work environment, requiring attention to accessibility and adaptability.

Key considerations include:

- Awareness: Employers should be familiar with basic categories of assistive technologies and how they support job functions.
- Accessibility: Workspaces may require adjustments (e.g. height-adjustable desks, visual/audio alerts, screen reader-compatible software).
- Privacy and dignity: Respect for the user's autonomy, preferences, and need for discretion in using certain devices.
- Reasonable accommodations: Legal and ethical obligations to provide or allow use of appropriate aids (as defined by national laws or EU directives).
- Ongoing support: Some devices may require maintenance, training, or adjustments over time. Employers should establish a communication channel to address these evolving needs.
- Avoiding assumptions: Each person and device is unique—employers should ask, not guess, what support is needed.

By creating an environment of openness and collaboration, employers help remove both physical and attitudinal barriers, empowering employees with assistive needs to thrive professionally.

2.3. Criteria for selecting appropriate assistive technologies

Recommending or selecting an assistive device requires more than matching a tool to a diagnosis. It involves understanding the individual's **functional needs**, **goals**, **context of use**, and **personal preferences**.

Important selection criteria include:

- Functional match: Does the device address the specific task the person wants or needs to perform?
- Ease of use and training requirements: Is it intuitive? Does it require extensive setup or practice?
- Compatibility: Will the device work with existing systems or environments (e.g., computer systems, mobility constraints)?
- Adjustability and customization: Can it be tailored to the user’s unique needs or preferences?

- Portability and independence: Does it support mobility and autonomous use, or require assistance?
- Social acceptability and user comfort: Is the person comfortable using the device in social or professional settings?
- Maintenance and technical support: Is ongoing support available if problems arise?

In some cases, professional assessment by an occupational therapist or assistive technology specialist is essential to ensure an optimal match between person, task, and tool.

References

[1] Azevedo, F. X. M., Heimgärtner, R., & Nebe, K. (2023). Development of a metric to evaluate the ergonomic principles of assistive systems, based on the DIN 92419. Ergonomics, 66(6), 821–848. https://doi.org/10.1080/00140139.2022.2127920

[2] Marinaci, T., Russo, C., Savarese, G., Stornaiuolo, G., Faiella, F., Carpinelli, L., Navarra, M., Marsico, G., & Mollo, M. (2023). An inclusive workplace approach to disability through assistive technologies: A systematic review and thematic analysis of the literature. Societies, 13(11), 231. https://doi.org/10.3390/soc13110231

[3] Lorke, M., & Stefanou, T. (2025). Improving research and development of wearable assistive and rehabilitation technologies: A systematic review on diversity factors. Journal of NeuroEngineering and Rehabilitation, 22, Article 31. https://doi.org/10.1186/s12984-025-01562-7

[4] Sweeting, A., Warncken, K. A., & Patel, M. (2024). The role of assistive technology in enabling older adults to achieve independent living: Past and future. Journal of Medical Internet Research, 26, e58846. https://doi.org/10.2196/58846World Health Organization, & UNICEF. (2022). Global report on assistive technology. World Health Organization. https://www.who.int/publications/i/item/9789240049451

[5] World Health Organization. (2023). Assistive technology: Fact sheet. https://www.who.int/news-room/fact-sheets/detail/assistive-technology

[6] Assistive Technology Industry Association. (n.d.). What is assistive technology? https://www.atia.org/at-resources/what-is-at/

[7] Business Disability Forum. (n.d.). What is assistive technology? https://businessdisabilityforum.org.uk/resource/technology-toolkit/what-is-assistive-technology/

[8] Rehabilitation Engineering and Assistive Technology Society of North America. (n.d.). RESNA. https://en.wikipedia.org/wiki/Rehabilitation_Engineering_and_Assistive_Technology_Society_of_North_America

[9] Global Disability Innovation Hub. (n.d.). Global Report on Assistive Technology. https://at2030.org/global-report-on-at/