Research article

Historical review of inclusive educational theories through digital archives

Recorrido histórico por las teorías educativas inclusivas a través de los archivos digitales

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Abstract
Introduction: This study is framed in the field of social inclusion of people with disabilities, following the guidelines of the United Nations Convention (2006) and the Sustainable Development Goals (SDGs) of the 2030 Agenda. The main objective is to provide a historical overview of inclusive theories to undestand their social impact and their application in the educational field. **Methodology**: The methodology is qualitative and is approached from a hermeneutic-interpretative perspective, based on the analysis of bibliographic and documentary sources. **Results:** Among the results obtained, the sources found and the organisations that advocate for the social model of functional diversity stand out. However, for its actual implementation, more support resources are required in the educational sphere. **Discussions:** The digitization of archival materials demonstrates that knowledge becomes accessible when adapted to an open publication format, which can be accessed anywhere. **Conclusions**: The creation of an open-access learning resource repository is another inclusive measure proposed, to share adapted materials. Following the principles of the SDGs, a successful sustainable development program is achieved by creating partnerships with civil society and promoting initiatives that reduce inequalities.

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Resumen

Introducción: Este estudio se enmarca en el ámbito de la inclusión social de las personas con discapacidad, siguiendo las directrices de la Convención de Naciones Unidas (2006) y los Objetivos de Desarrollo Sostenible (ODS) de la Agenda 2030. El objetivo principal consiste en hacer un recorrido histórico por las teorías inclusivas para conocer su impacto social y su aplicación al ámbito educativo. **Metodología**: La metodología es cualitativa y se aborda desde un enfoque hermenéutico-interpretativo, basado en el análisis de fuentes bibliográficas y documentales. **Resultados:** Entre los resultados obtenidos, destacan las fuentes encontradas y los organismos que defienden el modelo social de la diversidad funcional, aunque, para su aplicación real, se requieren más recursos de apoyo en el ámbito educativo. **Discusión**: La digitalización de materiales de archivo demuestra que el conocimiento es accesible al adaptarse a un formato de publicación abierta, al que se puede acceder desde cualquier lugar. **Conclusiones**: La creación de un repositorio de recursos de aprendizaje en abierto es otra medida inclusiva que se propone, para compartir materiales adaptados, pues, siguiendo los principios de los ODS, un programa exitoso de desarrollo sostenible se consigue creando alianzas con la sociedad civil y promoviendo iniciativas que reduzcan las desigualdades.

Palabras clave: historia; educación; inclusión; discapacidad; diseño; universal; aprendizaje; impresión 3D.

1. Introduction

The origins of the social model of functional diversity stem from the initiatives undertaken by people with disability in a disabling environment such as the university context. Universal Design (UD) was specifically implemented in the USA in the area of architecture in the 70s, although other lines of action such as Design for All had been developed. The latter started with Scandinavian functionalism in the 50s and advocated normalization (Rubio, 2009), while the concept of One Society for All, which mainly referred to accessibility (Hernández, 2011), became established in Sweden in the 60s.

Edwards Verne Roberts, forerunner of the social model of functional diversity, studied at the University of California, and his collection is preserved in the main library, which can be consulted through the digital archive (Roberts, 2005). In the same way, Thomas Lamb and Marc Harrison made significant contributions to this movement, but their archives (Lamb, n.d.; Harrison, n.d.) have not yet received sufficient attention, although some graphic materials can be viewed virtually.

The inclusive model of Ronald Lawrence Mace (Connell et al., 1997; Mace et al., 1991), developed at the Center for Universal Design (CUD, 2024), is also a reference for Universal Design, and its collection is housed in the Archive of North Carolina State University (Mace, 1998). Additionally, Universal Design has its application in the educational field through learning theories promoted by the Center for Applied Special Technology (CAST, 2011 and 2018), which has an online documentation portal with educational resources.

For these reasons, this study aims to provide a historical overview of digital archives to showcase the first inclusive experiences of the social model of functional diversity and to observe its social impact and application in the educational field.

To trace the evolution of inclusive theories and their expansion to other countries, documentation from the European Forum and the Institute—both of which advocate for

universal accessibility and independent living for individuals with functional diversity—has been identified. Open access to the documentation facilitates the study's objective by providing sources that help to understand the formation of the social model of functional diversity and identify the materials available in the archives and documentary portals of the supporting institutions.

To conclude, this study aims to promote the use of new accessible techniques, such as 3D printing, which advance inclusive theories by facilitating the creation of support resources tailored to individual needs. From this inclusive perspective, reducing inequalities is deemed fundamental to achieving an inclusive society, where no one is left behind and sustainable development becomes central to the UN's work, with the 2030 Agenda as an imperative for change (CERMI, 2019).

1.1. Background and current state of the topic. The social model of functional diversity

In 1962, Edwards Verne Roberts (1939-1995), a student with a disability that was regarded as severe, attempted to break the barriers to higher education; although, at the time, four universities already had an adapted environment, he did not choose to enroll in any of those. He decided to study Political Sciences at the University of California and to live at the campus' healthcare center in Berkeley, where he would sleep in his iron lung and rely on the support of a personal assistant during the day (Roberts, 2005). Encouraged by his experience, twelve other students subsequently enrolled and the university drew up a Disabled Students' Program (1970) that relied on state support to meet the needs of every individual (Palacios, 2008, García, 2003). Its development and dissemination led to the creation of the "Independent Living Movement", which advocates the full participation in society of people with functional diversity.

Márquez-Ramírez (2015) claims that this movement set the foundations for an anti-discrimination law to protect people with disabilities in the USA and extended its scope to Canada (1985), Australia (1982), New Zealand (1993), The United Kingdom (1995), Spain (2003) and Mexico (2005). Currently, the strongest promoters of the independent living philosophy are the European Disability Forum (EDF, 2007), which defends the values set out in the United Nations Convention on the Rights of Persons with Disabilities (ACNUDH, 2006), and the European Network on Independent Living, which advocates for independent living (ILI, 1993) where "the built environment, means of transport and information are accessible, where technical support, access to personal assistance and/or community services are available" (ENIL, 1990). This line of research, defined by the social model, was the context in which the Universal Design paradigm became forged as a result of various individual initiatives. Among them that of Thomas Lamb (1896-1988), an industrial designer who made products to relieve "pressure on the hands" aimed at war veterans who experienced mobility difficulties and relied on the use of crutches (Lamb, n.d.). Also outstanding was Marc Harrison (1936-1988), a university teacher with brain injury as a result of an accident, who designed the first accessible kitchen products contemplating diversity. Initially, his most acknowledged invention was the "Cuisinart" food processor, since he tried to "make it more accessible to people with a broad range of physical abilities" (1978), and he later became involved in the universal kitchen project (1993) with his students at the Rhode Island School of Design (RISD). For this purpose, they examined how household kitchen tasks were performed, analyzing movements and minimizing the number of steps that were required in the process of cooking, thus establishing the theory and practice of Universal Design. However, Harrison was not to witness the final result, since he died of amyotrophic lateral sclerosis (ALS) on 22 September

1998. The Universal Kitchen prototype was presented in the following months, between November 1998 and March 1999, at an exhibition that was held in the Cooper-Hewitt National Design Museum in New York (Harrison, n.d.).

Another pioneer was Ronald L. Mace, a young architect who founded the Center for Universal Design (CUD) in North Carolina State University (NCSU). The center followed the guidelines of the architectural movement, which was at its peak in the USA, with the purpose of designing buildings that were thought from the beginning, meaning before their construction (Alba et al., 2011-2014), to cater for the variety of its users' access, communication and usage requirements. In this regard, Universal Design foresees the problem and offers accessible products and environments without the need for subsequent adaptation.

The main achievement of this paradigm was the extension of benefits to other population groups. Albeit the original intention was to improve accessibility and usage conditions for people with disabilities, the impact proved greater, since the design stood in the service of society. After the studies by Mace et al., (1991), Hernández (2011) acknowledge that the main goal of Universal Design is to make life easier for everybody, ensuring that products, communication and built environments are more usable by all people to the greatest extent possible.

Hence, this model makes universal accessibility possible by ensuring access and enjoyment of built environments for all people (López & Borau, 2011), without the need to engage in subsequent adaptations for people with specific needs; adaptations that involve greater costs and are in many cases against the original spatial design of such environment.

1.1.1. From Universal Design for Learning to 3D Digital Design

The paradigm that focuses on education is Universal Design for Learning (UDL). It originated in the USA when a psychopedagogy team studied the possible curricular adaptations that could be implemented at a children's hospital in the mid-80s, so that lessons could be adapted to each student (Meyer et al., 2016).

In American universities, UD was also implemented in teaching and learning processes in the late 90s (Ruiz et al., 2012). As noted by Guasch and Hernández (2012), there are currently several similar words that refer to the same term, although each has its own nuances: Universal Design for Learning (UDL), Universal Instructional Design (UID), Universal Design for Instruction (UDI); or Universal Design in Education (UDE) (Guasch & Hernández, 2015).

Rose and Meyer (2000) found that it is possible to remove learning barriers by establishing a flexible curriculum where diversity is taken into account. This teaching approach, developed by the CAST, uses the principles of UD to offer spaces and resources that are accessible to all people. However, the principles of UDL are not constrained to physical access to the classroom but encompass all the elements that influence students' education (CAST, 2011). Besides, because of the brain's variability, there are different ways to access learning and many ways to express what the student knows. Its substantiation is based on progress in neurosciences and image diagnosis, learning theories, the results of practice and educational research, and technological contributions (Alba, 2019). As noted by Rose and Meyer (2000, p. 3): "New technologies for studying the brain are yielding an increasingly accurate articulation of the concept of learning-revealing not one generalized learning capacity, but many different modules and distributed processes for learning within the same brain".

One of the significant statements of the UDL approach (CAST, 2011, 2018), which was subsequently developed in Spain, is that there are not two watertight categories of people, with and without disability, but that there is no difference between those who need adaptations and those who do not (Alba et al., 2011-2014), because space and products are accessible for everyone. Also according to the mentioned author, even if a ramp is originally designed to make access possible for a person in a wheelchair, who has not used it to push a baby carriage, a shopping cart, a suitcase or a bicycle? (Alba et al., 2011-2014). Likewise, as far as teaching resources are concerned, a product that meets the needs of people with visual impairment is very helpful for people with handling problems, so that its use expands and is made easier for any user (Aragall, 2008).

In any case, to ensure accessible learning, resources should ideally be directly usable for as many users as possible, foresee complementary adaptations, involve alternative systems that are neither stigmatizing nor excluding, and be compatible with already existing accessories for those who cannot use them directly. It should not be forgotten that there are people who use prostheses (as limb replacements), orthoses (to improve function) or technical aids (Aragall, 2008).

UD also facilitates access to and use of teaching resources from the perspective of a diversity that can vary in time. Any person at any point may become injured or affected by a mobility problem, so a ramp will make moving around easier. If the person breaks an arm and cannot use the dominant hand to write, a speech-to-text transcription device will enable the same functions to be performed, but in a different manner. These are temporary conditions for which resources that are accessible to all provide immediate solutions. Besides, as noted by the World Health Organization, "disability is part of the human condition, since almost everyone will become temporarily or permanently impaired at some point in life, whether as the result of accidents or as a consequence of old age" (cited by European Agency for Special Needs and Inclusive Education, 2015 p. 16). Aging involves a decline in functional capacity, and physical, and psychological abilities, and sensory and cognitive skills deteriorate. This circumstance is further complicated by certain environmental limitations and because products do not meet the needs of such population group. In this sense, 3D printing is considered in this study as a technological solution that provides personalized responses to the needs of each individual.

Currently, 3D printing has enhanced the quality of life of people with disabilities through the development of objects that facilitate the use of tools in domestic settings, reduce physical barriers in mobility, and promote movement in various spaces. Additionally, they enable the adaptation of educational materials in the educational field for greater cognitive and sensory accessibility. In addition to being low-cost and highly useful products, they offer aesthetic features that change attitudes towards individuals with disabilities.

Examples include the Wheelwear wheelchair (Disrupt Disability, 2016), which adapts to the user's body and environment by allowing for the creation of new parts that can be attached to the wheelchair. The backrest, seat or wheels can be changed to fit the user's daily lifestyle. Similarly, Opens Bionics (2021) stands out as a pioneer in designing a bionic arm, the Hero Arm, which aids individuals who have undergone below-elbow amputations in regaining functionality through a custom-printed and uniquely designed prosthesis. According to Opens Bionics (2021), worldwide upper limb amputations are estimated at five million.

Through the initiative "Giving the World a Helping Hand" by the E-nable association (2020), 3D-printed prosthetics can be obtained. With two thousand volunteers collaborating on the design and improvement of arm and hand prosthetics, the beneficiaries have now reached

eight thousand. Additionally, they have worked on developing a resource guide compiling studies on materials produced via 3D printing during the lockdown period.

The non-profit organization See3D (2017) manages the distribution of 3D-printed products suitable for individuals with visual impairments. They have distributed over one thousand four hundred models to 23 different states, with models typically incorporating braille systems.

Cura (n.d.), Cult (n.d.), MyMiniFactory (2024), Thingiverse (2021) and Tindercad (n.d.) are web platforms dedicated to sharing user-created digital design files. As products increase daily, it is necessary to have a resource bank to locate already created objects and categorize them, providing more efficient service to people with disabilities and assisting them precisely in their selection and use. Thus, the potential of theories developed over the years is enhanced, finding tailored solutions to each individual's needs in the present context.

2. Methodology

The methodology of this study is qualitative and is approached from an interpretative hermeneutic perspective. For source localization, searches were conducted in the digital archives of American universities (see table 1). Archive Space, an open-source archival information manager, was used to narrow down the research.

The Bancroft Library at the University of California, Berkeley, houses special collections with manuscripts and unique materials of great interest for research. Zona Roberts, the mother of Edwars V. Roberts, donated her son's documents to this library, and the collection was supplemented with archives from the "Word Institute on Disability" (Roberts, 2002).

Additionally, publications were found in digital archives such as the Metro West Center For Independent (Shapiro, 1993), Internet Archive (Kent & Quinlan, 1996; Preiser & Ostroff, 2001), and Disability Studies Quarterly by The Ohio State University (Brown, 2000), which provide some background history of the social model of functional diversity. These sources have been digitized after their publication, as the printed edition was published in New York, but open access has facilitated greater dissemination.

Table 1.

Digital Archives

Author	University or Agency Responsible	Archive or Resource Center
	Bancroft Library, UC Berkeley	On Line Archive of California (OAC)
	Smithsonian Afiliations	National Museum of American History
Edward V. Roberts	Metro West Center For Independent (MWCIL, n.d.)	MWCIL Resources
	Waybackmachine	Internet Archive
	The Ohio State University	Disability Studies Quarterly

Ronald L. Mace	North Carolina State University	Archival Collections at NC State University Libraries. Special Collections Research Center (SCRC), North Carolina State University Libraries, Raleigh, NC Center for Universal Design (CUD) College of Design, Center for Universal Design Records 1985-2023
Thomas Lamb y Marc Harrison	Smithsonian Afiliations	Hagley Digital Archives Hagley Museum and Library
Rose Meyer Anne Meyer, David Rose, Skip Stahl, and Grace Meo	Center for Applied Special Technology	National Center on Accessible Educational Materials (AEM Center). Center on Inclusive Technology & Education Systems (CITES)
	The CAST Board of Director	Founders' Fund for Innovation

Source: Own elaboration (2024).

The following collection selected is that of Ronal L. Mace, whose collection is housed in the library archives of North Carolina State University, where he graduated with a degree in Architecture from the School of Design and was concerned with the rights of people with disabilities.

The subsequent document search was conducted through the Hagley Archive, which features a database for locating documentary collections. "The Hagley Digital Archives provide online access to selected items from the Hagley Library's collection of images, documents, and publications related to the history of business, technology, and society" (Smithsonian Affiliations, n.d.). For this study, two collections have been selected to justify the pioneering initiatives of universal design: the papers of Thomas Lamb (ID: 2181) and those of Marc Harrison (ID: 2193).

The documentation related to the Centre for Applied Special Technology (CAST, 2022) is available on the organization's website. Its promoters were Anne Meyer, David Rose, Skip Stahl and Grace Meo. In 1984, they established the theoretical and practical guidelines for Universal Design for Learning. The organization also provides specific centers with accessible educational resources, such as: "National Center on Accessible Educational Materials" (CAST, n.d.) and "Center on Inclusive Technology and Education Systems" (CAST, n.d.). In addition, the CAST Board of Directors created the Founders' Fund for Innovation (CAST, 2024).

3. Results

In the Edward V. Roberts archive, his contributions towards making universities accessible to people with disabilities are documented, as well as the dissemination of his theories through his lectures and collaboration with international organizations, which led to the Independent Living Movement. His motivation stemmed from his personal experiences. At the age of 14, Roberts contracted polio and became quadriplegic. However, this experience did not stop him, and in 1962, when he began his undergraduate studies, Roberts lived on the campus of the

University of California, Berkeley. "When Roberts completed his bachelor's and master's degrees in political science, he became politically active, promoting the rights of disabled people and the independent living movement" (Roberts, 2002).

The located collections, which demonstrate his contributions, are organized into four series. In the first series. In the first series, his writings are classified into articles; speeches and testimonies. Among the articles are drafts and published writings, notes, forewords, reference material, and other writings; the speeches section contains summaries and notes, drafts and transcripts; and in the testimonies section, Edward's statements and his expert testimonies at legislative hearings.

The Collection is open to research, but only fifteen writings, ten speeches and five testimonies have been digitized. The second series, 'Professional Activities', is organized into five subseries: 'California Department of Rehabilitation, Disabled Persons International (DPI), World Institute on Disability (WID), Professional Appointments and Public Appearances'. The 'California Department of Rehabilitation' includes correspondence, interviews and reports; the DPI subseries contains documentation on work in countries worldwide, information on the US branch, and materials from international conferences. WID contains funding materials, correspondence and thematic archives. 'Professional Appointments' includes records of his positions on numerous boards and advisory committees, illustrating Roberts' involvement in political and altruistic endeavors. "Public Appearances" provides information on his frequent travels for appearances and meetings across the United States and worldwide.

The third series is organized into ten subseries: 'General', 'International Organizations', 'Independent Living', 'Assistive Technology', 'Transportation', 'Accessible Architecture', 'Employment', 'Health Care', 'Therapy and Rehabilitation', 'Injury Prevention' and 'Individuals'. '

Table 2.

Guide to the Edward V. Roberts Papers 1975-1998

Serie 1 (1959-1994)	Serie 2 (1962-1995)	Serie 3 (1975-1998)	Serie 4 (1953-1998)
Writing	Professsional Activities	Roberts´ involvement in organizations	Other writings
Articles (1959-1992): C1 F1-16	California Departament of Rehabilitation 1962-1982: C1 F49-60 OB, F1	General, 1983-1998: C6 F59-78, C7 F1-19	C10, F28-38 Correspondence
Speeches (1976-1993): C1 F17-36	Disabled Persons International (DPI): 1979-1994: C1 F60-67, C2 F1-31	International Organizations, 1981-1995: C7 F20-29	C11, F9-17 Awards
Testimonies (1978-1994): C1 F37-48	World Institute on Disability (WID): 1983-1995: C2 F32-38, C3 F1-34	Independent Living, 1986-1994: C7 F30-37, C8 F1-14	C11, F18-20 Interviews
	Professional Appointments: 1981-1995: C3 F35-43, C4 F1-25, C5 F1-23	Assistive Technology, 1984-1994: C8 F14-30	C11, F21-61 Memorials
	Public Appearances: 1981-1995: C5 F24-62, C6 F1-78, C7-9, C10 F1-27	Transportation, 1987-1994: C8, F31-41	Press Clippings, 1956-1995: OB, F2-10,

Accessible Architecture, 1987-1994: C8 F31-41	
Employment, 1986-1995: C8 F42, C9 F1-7	
Heath Care, 1982-1994: C9 F8-17	
Therapy and Rehabilitation, 1975-1994: C9 F18-27	
Injury Prevention 1986-1992: C9 F28-35	
Individuals 1983-1995: C10 F1-27	

Source: Own elaboration (2024) based on Roberts (2002). Leyend: C: Carton; F: Folder; OB: Oversize Box.

The category 'General' includes information gathered on organizations and research in the United States on general disability rights groups and issues; 'International Organizations' contains materials sourced from non-profit organizations and disability rights groups overseas, including those from Russia, Japan and Brazil. 'Independent Living' focuses on resources related to organizations and research aimed at enabling individuals with disabilities live independently and integrate fully into society; 'Assistive Technology' comprises documentation concerning the development and application of new technologies designed to assist people with disabilities; 'Transportation' provides information on accessibility in travel and transportation, while 'Accessible Architecture' addresses architectural considerations for accessibility. The section 'Employment' includes project proposals and programmes aimed at promoting employment opportunities for people with disabilities. 'Health Care' contains documentation on national and California state policies on healthcare care and insurance reform. 'Therapy and Rehabilitation' offers information on organizations and research initiatives in physical rehabilitation and psychological therapy, whereas 'Injury Prevention' focuses on documentation related to disability prevention strategies such us road safety, public health, and immunizations. Finally, 'Individuals' encompasses projects submitted to Roberts by activists, writers, filmmakers, and others.

The fourth series contains miscellaneous documentation, including Roberts' personal care history, curriculum vitae, correspondence, event calendars, awards, interviews, memorials, posthumous articles, and numerous press clippings (see table 2).

The inventories of Thomas Lamb and Marc Harrison are well-organized and provide several common informational elements, including a biographical note, scope and content description, administrative information, related materials, controlled access headings, as well as other specific details unique to each collection.

Table 3.

The Thomas Lamb Paper´s

Business papers and textual materials 1912-1996	Box
Business papers, 1916-1996. Correspondence, notebooks, drawing, publicity files and personal writings	B1, BOS1, B13
Patents	B1, B2, BOS1, BO5
Publicity materials	B3, B44,BOS5, BOS10, 11, 14, 15, 17 y 18

Cutco, Wear-Ever Files, 1949-1973	B4-5, BOS1 y 5.
Kiddyland and Other Children´s Objects, 1919-1948	B5-6, BOS5 y 2, B17-18
Bing-O, 1926-1945	B6-7
Technical Studies, 1927-1975	B7-9, BOS5-7, MD-96
Publicity, 1922-1996	B9-10, BOS 2-3 y 7
Artifacts and graphics 1943-1961	
Baggage. Luggage, and Carrier Handles	B17A y 21A, 17-21:
Castings	B22-28
Cookware	B29-36, 71
Cruth Handles	B37-38
Cutlery	B39-41, 77-78, BOS19-20, BOS10 y 12-13
Hand Woodworking and Metalworking Tools	B42-48 y 70, BOS13
Gardening Tools	B70
Printing/Engraving plates	B49
Miscellaneous Handles	B49, 72-73 77A
Plastic Handles	B50-51
Household Items	B52-56, 70, 72, 75-76
Measureing Instruments	B57
Post Office	B57
Early Development Studies	B57
Handle Models	B60-62
Iron Models	B63
Raw Material	B64
Rifles	B65
Sporting Goods	BOS20, b70, 73 y 76
Welding Torches	B67 y 72
Surgical Instruments	B 67-69
Kiddyland and Other Children´s Objects	B73-74
The Tale of Bing-O	B75 y 80, BOS10
Textiles	B79
Miscellaneous	B58-59 y 70

Source: Own elaboration (2024) based on Lambs (n.d.). Leyend: B: Box; BO: Box Original; MD: Drawer; O: Oversize.

Thomas Lamb's documentary sources (ID: 2181) are classified into two categories of analysis: "Business papers" and "Artifacts", containing documentation from 1912 to 1996. Meanwhile, Marc Harrison's collection inventory is organized into papers, drawings, Schlumbohm/Chemex scrapbooks and artifacts, and cover the period from 1928 to 1996.

The artifacts of Thomas Lamb (1943-1961) include molds, models and casts in clay, metal, plaster and wax, as well as various items made from lamb handles: hairbrushes, cutlery, suitcases, crutches, tennis rackets, golf clubs, garden tools, among other objects. Lamb's main output consists of artefacts and graphics, although he also has significant textual material (see table 3).

Lamb's concern for providing technical aids to war veterans has led him to be remembered in history as 'the handle man'. His crutch design was trademarked: Lamb's 'Lim-Rest', although it was never manufactured. However, the ergonomic handle was patented and became universal. Additionally, his idea was applied to other utensils such as cutlery, surgical and dental equipment, and sporting gear.

The Lamb´s Collection is open for research and includes a selection of items available online at the Hagley Digital Archives (Smithsonian Affiliations, n.d.).

In Marc Harrison's case, his collection serves as a testament to his work in the designing products for people with different abilities, from the Universal Design approach. The collection consists of four series. The first contains written material about the Harrison School of Design and Harrison Associates, including business documents, correspondence, reports, legal records, advertising material and publications, among others. The second is the most extensive since it contains drawings of designs and projects. The third consists of scrapbooks and photographs; and the fourth features artifacts, a small collection of products designed by Harrison, including the Cuisinart food processor, Cuisine knives, a Krups fan and a Quartzpower heater.

The Harrison´s Collection is open to research and has a selection of items available online at the Hagley Digital Archives (Smithsonian Affiliations, n.d.).

Table 4.

The Marc Harrison Paper´s 1928-1996

Business papers and textual materials	Box
Papers, 1946-1996	
Rhode Island School of Design, 1946-1996	B1-3, O1-2
Marc Harrison Associates	B4-5, O1-2
Lightsoeed Graphic Computer System, circa 1985	O1-3, B5-6, OB2
Proposals and Staments	B7
Times Sheets	B7
Correspondence, 1958-1994	B7
Legal Records, 1978-1995	B7
Philips Corp. v. Sears Roebuck Co, 1995 October 20-1995 November 17	B7
Civil Suits With Cuisinart, Inc.	B7-8
Exhibits , 1983-1994	B8
Publications, 1980-1988	B8, O3
Clippings, 1976-1992	O1, B8
Miscellaneous, 1959-1996	O2
Drawings, 1971-1996	
Rolled Drawings	O10-18, S. JJ. 2-4
Flat Drawings	O3-9, MD99-101, B8

Schlumbohm/Chemex Scrapbooks, 1928-1979	
Scrapbooks	O19-22, B9
Photographs	B9
Artifacts	**BA1-13, Bo.**

Source: Own elaboration (2024) based on Harrison (n.d.). Leyend: B: Box; BO: Box Original; MD: Drawer; O: Oversize, S: Shelf.

The Ronald L. Mace collection is organized into five series: "Alphabetical Files"; "Project Files"; "Publications", "Videotapes", and "Artifact". The documentary collection (ID MC 00260) consists of 10 archival boxes, 1 legal box, 1 artifact box, and 16 flat folders, and shows the work developed by Mace in architecture and design projects.

Table 5.

Ronal L. Mace Papers 1974-1998

Series	Size
Alphabetical Files, 1978-1993	1.5 linear feet (3 archival boxes)
Conference information, correspondence, design consultations, disability reports and rights material	B1 F1-19, B2 F1-19, B3 F1-13
Project Files, 1979-1998	5.5 linear feet (3 archival boxes, 1 legal box, 16 flat folders)
Accessibility budgets, architectural drawings, photographs, proposals, reports, site surveys, and work files	B9 F1-10 LB10 F1-19 O13 FF1-16, B11 F1-9, B12 F1-7
Publications 1974-1998	1.5 linear feet (3 archival boxes)
Handbooks; Guides; Guidelines for Modifications to Existing Buildings for Accessibility to the Handicapped; A Manual on North Carolina's Building Code Requirements for Accessible Housing; ADA Accessibility Guidelines; The Planner's Guide to Barrier Free Meetings; and Five volumes on the Accessible Products and Design Information System (APDS)	B9 F1-10 LB10 F1-19 O13 FF1-16, B11 F1-9, B12 F1-7
Videotapes (undated)	0.5 linear feet (1 archival box)
"Open For Business", Disability Rights Education +Defense Fund (DREDF)	VT, Box 7, Folder 1
"Toward Universal Design", The Universal Design Initiative	VT, Box 7, Folder 2
"Work in Progress: A Video about Title II of the Americans with Disabilities Act (ADA)"	VT, Box 7, Folder 3

"Work in Progress: A Video about Title II of the Americans with Disabilities Act (ADA)", with AD.	VT, Box 7, Folder 4
Artifact (undated)	0.25 linear feet (1 artifact box)
Ronald Mace's personal library embosser.	CB 8

Source: Own elaboration (2024) based on Mace (1998). Leyend: B: Box; CB: Card Box; F: Folder; FF: Flat Folder; LB: Legal Box; MD: Drawer; O: Oversize, S: Shelf; V: Volume; VT: Videotape.

Mace successfully developed the first building code for accessibility in the United States, which became law in 1973 and served as a model for other states. His pioneering work in the field of accessible design was instrumental in the enactment of national legislation prohibiting discrimination against people with disabilities. (Mace, 1998).

Currently, the EDF provides a good channel of participation to continue improving people with disabilities' conditions and quality of life (EDF, 2007). This non-governmental organization defends the interests of over 100 million people with disability at the European level, following the values of the United Nations Convention on the Rights of Persons with Disabilities (ACNUDH, 2006). Moreover, the strategy's implementation relies on the direct participation of representative organizations of people with disability. In the case of Spain, people with disability are covered by four organizations that are ascribed to the Forum: Yuste Foundation, ONCE Foundation, European Deafblind Network and Spanish Committee of Representatives of Persons with Disabilities (EDF, 2007). Altogether, there are 104 from 41 European countries, which shows a high representation of Spanish entities, since the average is 2.6 organizations per country. Another organization is the ENIL (1990), which, as the EDF, promotes the implementation of inclusive laws.

Other bodies, such as the UN or the Commission of the European Communities (2000) also made a qualitative leap by opting for Universal Design and the social model of functional diversity, from the adoption of the Standard Rules (UN, 1993) to the celebration of the Convention on the Rights of Persons with Disabilities (2006). The effect of these inclusive measures in Spain was normative regulation (Instrument of Ratification, 2008). Moreover, the inclusive approach is especially reinforced by Law 6/2022, of 31 March, amending the Consolidated Text of the General Law on the Rights of Persons with Disabilities and their Social Inclusion, approved by Royal Legislative Decree 1/2013, of 29 November, to establish and regulate cognitive accessibility and its conditions of requirement and application.

In the educational field, inclusive theories have been incorporated into legislation. Thus, the Universal Design for Learning, promoted by CAST, is present in the regulations governing the Spanish educational system, so the necessary inclusive resources must be provided to implement this theory.

4. Discussion

The concept of Universal openness has progressed with paradigms such as normalization, Universal Design, Design for All, and the Independent Living Movement. Additionally, the disability advocacy network has played a crucial role in transforming the demands of people with disabilities into rights. Among these, the "Independent Living Movement" represented a significant advancement by challenging environmental limitations and asserting human dignity as both a right and a good (ILI, 1993).

Similarly, the most important implication of "Universal Design" lies in shifting the focus of disability from the individual to the environment. This means that if a person cannot access a building or use a resource without assistance, the main reason is not the person's disability, but rather the building or product that limits access or makes usage difficult. Hence, environments and resources are defined as disabling when they are not universally designed to accommodate everyone (Alba et al., 2011-2014). This is how Universal Design for Learning is conceived, as an innovative pedagogical proposal to meet each student's individual characteristics, based on neurosciences, image diagnosis, cognitive and constructivist learning theories, educational research and new technologies (Alba, 2019). The CAST proposes a flexible curriculum where students have access to learning with the appropriate means, and a similar methodology is followed in the higher area from the approach of the Universal Design for Instruction and Curricular Development. In this regard, Information and Communication Technologies prove ideal teaching resources, since they offer the possibility of learning using different forms of presentation to make information accessible (Rose & Meyer, 2002).

In the educational context, it is the responsibility of schools to ensure the provision of the necessary resources to guarantee inclusion, with the collaboration of the administrations. This includes avoiding the generation of new barriers in the purchase of products, classroom refurbishment, development of resources and teaching materials, and eradicating these limiting barriers in attitudes and behaviors. In the use of resources, it is essential to implement pedagogical measures that facilitate access to quality education and ensure inclusive education through appropriate teaching methods.

The inclusive theories, which have been developed through the contributions of individuals such as Roberts, Lamb, Harrison, and Mace, among others, demonstrate significant achievements. However, their continuity can be ensured through the adoption of new accessible techniques, such as 3D printing, which allows for the creation of materials tailored to the needs of each individual, for use in the educational sphere as well as other areas of social life. Moreover, these materials, serving as support resources for individuals with functional diversity, can be shared through repositories.

The digitization of archival materials showcases that knowledge is also accessible by adapting to an openly published format, which can be accessed from anywhere. This has enabled the discovery of additional international sources, whose existence was previously unknown until their digitization.

In order to make further progress in education, teachers must acquire skills in curriculum design and universal accessibility. Encouraging interdisciplinary learning is also important, as knowledge across different disciplines can complement each other when shared, leading to collaborative initiatives for positive action.

Furthermore, the establishment of an open-access learning resource repository is proposed as another inclusive measure to disseminate adapted materials. Embracing the principles of the Sustainable Development Goals (SDGs), a sustainable development program can be effectively implemented through partnerships with civil society and the promotion of initiatives aimed at reducing inequalities.

In the educational field, the current situation can be optimized by organizing training meetings with teachers to train them in the use of new techniques, such as 3D printing. In addition, agreements and collaboration agreements can be established with companies that sell 3D products, disseminating them in a resource bank and even seeking sponsors to finance them. Those other objects that can be printed free of charge will be those that contribute to enriching

social knowledge and allow us to respond to people with disabilities and, especially, to those who are at risk of social exclusion, not only because of their dependency situation, but also because of a lack of economic resources, due to the high cost of disability support resources.

5. Conclusions

In every historical context, understanding the genuine needs of individuals is imperative to provide tailored solutions. The demands of Roberts laid the foundation for diversity support programs in American universities, illuminating a previously overlooked reality. Its impact on society gave rise to the "Independent Living Movement," advocating for the full social participation of people with disabilities. To further advance towards significant milestones, it is essential that support resources remain accessible to all members of society.

The Independent Living Movement marked a major step forward by denouncing environmental constraints and because it regards human dignity as a right and at the same time an asset (ILI, 1993).

Thomas Lamb pioneered the design of a crutch tailored for individuals with physical disabilities following World War II. Similarly, within the contemporary landscape, two Spanish researchers developed a bionic exoskeleton called 'In my hand,' facilitating daily activities and rehabilitation for individuals experiencing hand mobility impairment. This innovation was inspired by a mother's plea for her daughter, who suffers from spasticity in one hand (USAL, 2019). Hence, attentive listening to the perspectives of individuals with disabilities and concerted efforts to ensure their access to accommodating materials are crucial in safeguarding their rights across all spheres of life.

Today, we live in a globalized world where access to information is limitless when shared openly. This represents an advantage compared to past times when access was limited to printed materials, which sometimes were unknown due to their scarce dissemination, lack of funding or other reasons. In recent decades, the main challenge has been the dispersion of information that is difficult to control. In this regard, artificial intelligence represents a new tool that can provide new opportunities if the right algorithms are developed, as there continues to be segregation even in information search.

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