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Electrical Engineering
and Information
Technology*

Multimodality in Technical Communication: Bibliography

(https://bit.ly/multimodality_in_tc)



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Abstract

As a result of a research semester in the summer of 2022¹, a bibliography on multimodality in technical communication (TC) is presented. Given that TC primarily involves the development of instructional information, this bibliography holds relevance for anyone interested in the use of multimodality in the communication of procedural knowledge. The bibliography is publicly accessible as Zotero group library (https://bit.ly/multimodality_in_tc) and can be used and expanded.

After a description of the objectives and target group, the five disciplines from which the publications in the bibliography originate are presented. This is followed by information on the structure and search options of the Zotero group library, which are intended to support the search for publications on the respective research interest. The article concludes with some suggestions for collaborative efforts aimed at further enhancing and expanding the bibliography.

¹ I would like to thank the Hanover University of Applied Sciences and Arts for the opportunity to deepen my research on the topic of multimodality in Technical Communication during a research semester. Especially the colleagues in the degree programme Technisches Informationsdesign und Technische Redaktion relieved and supported me during this time!

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1 Target group, purpose, and access

The bibliography *Multimodality in Technical Communication* provides publications from five disciplines on the multimodal use of language (spoken and written) and visualisation (static and moving) in the field of Technical Communication (TC). In TC, the focus lies on the development of instructional information, so the bibliography is of interest to all who are concerned with the use of multimodality² in the communication of procedural knowledge.

The bibliography places a particular emphasis on digital resources, such as animations and videos, which are accessible through mobile devices (e.g., smartphones and tablets) or are integrated into product displays. In the resulting digital context of use, the options for the use of multimodal resources are also considerably expanded. The intention behind this bibliography is to facilitate access to these research results for researchers and practitioners.

TC is an interdisciplinary, application-oriented discipline; accordingly, the target group of the bibliography has a very heterogeneous knowledge background. Consequently, the subjects covered by the bibliography are equally diverse. Against this background, it seems sensible to select and present the publications according to the following principles:

1. The central focus of the bibliography is the transmission of procedural knowledge within TC. As such, it highlights publications that offer valuable insights into knowledge transfer on these topics.
2. The bibliography is intended to provide users with publications from various disciplines. Accordingly, the main strands of multimodality research are represented (cf. chapter 2).
3. To assist users with limited prior knowledge of multimodality research, the structure of the bibliography is designed to facilitate the interpretation of research findings presented in the publications (cf. chapter 3.1).
4. Index entries should lead users to the publications that match their questions. Accordingly, most of the index entries are supplemented with corresponding details concerning the medium, genre, study type, target group, and tools (cf. chapter 3.2).

The bibliography can be accessed as a Zotero group library via the following link: https://bit.ly/multimodality_in_tc. The author will continue to maintain this group library and hopes that some of the users will contribute publications they find interesting. To do so, please contact the author by e-mail (claudia.villiger@hs-hannover.de). You will then quickly receive the corresponding administration rights.

² While the term 'multimediality' primarily emphasises the nature of mediation and, consequently, leans towards technical aspects, the essential characteristic of the term multimodality is that different sign resources are integrated into an overall semiotic procedure (Schneider 2017, 143-144).

2 Research perspectives

Researchers and practitioners should have access to an understanding of the advantages and disadvantages associated with multimodal resources in the realm of Technical Communication (TC)/procedural knowledge transfer. This understanding spans across five disciplines:

1. Multimedia Learning and Instructional Design (approaches in psychology)
2. Multimodal Linguistics and Social Semiotics (linguistic/semiotic approaches)
3. Information Design and Visual Communication (image-centred approaches)
4. Human Computer/Machine Interaction

The first three disciplines (see also fig. 1) offer basics on multimodal-

ity and numerous publications on individual issues from different perspectives. The discipline Human Computer/Machine Interaction provides research results that relate to the digital context of use as well as work on spoken language and dialogicity³ (e.g. chatbots). As for TC, which represents the fifth subject discipline, it serves as a platform for interdisciplinary publications where specific multimodal application scenarios are discussed.

When applying research results, it is helpful if the main features of the respective approach are known. The following sub-chapters therefore attempt to briefly summarise the essential aspects of the five disciplines.

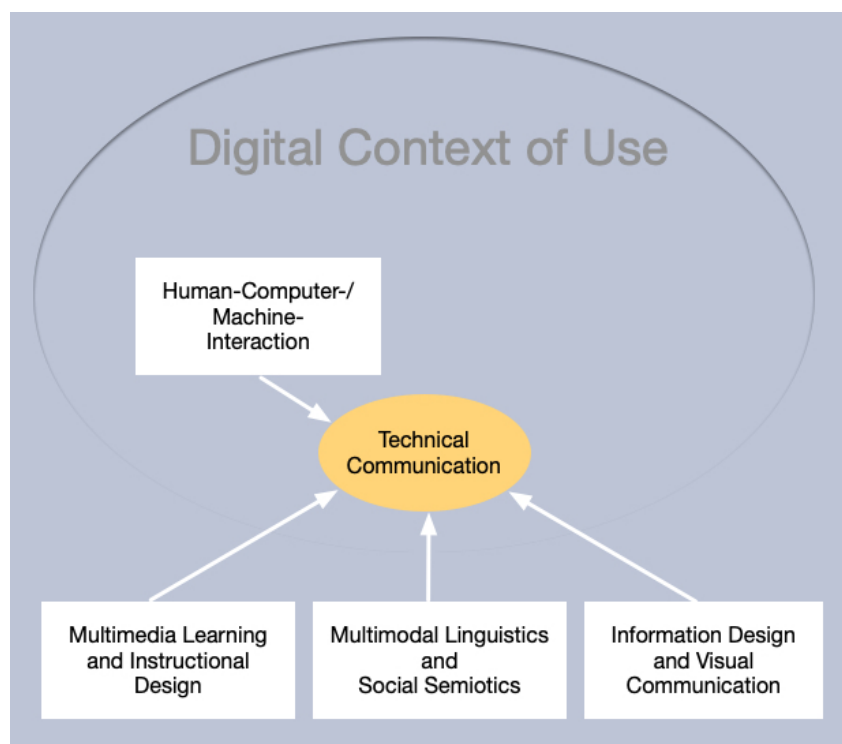


Fig. 1: Overview of research approaches relevant to multimodality in TC

³ According to Imo (2016, 338), dialogicity is characterised by the fact that the respective use of language is examined to see whether a dialogical implementation leads to an optimisation of the effect of the linguistic means.

2.1 Multimedia Learning and Instructional Design

Within the context of multimedia presentations, CTML offers fundamental insights into the impact on various types of memory, as illustrated in figure 2. In CMTL multimedia combinations are investigated, by considering factors such as retention, comprehension, and the outcomes of subsequent actions. The central assumption of the multimedia effect is supported by a large number of studies. Various principles are employed to analyse the specific characteristics of this effect, including an examination of users' cognitive load. In this way, CTML provides a basis for the effects of multimedia presentation on the different types of memory (cf. fig. 2). These multimedia combinations are investigated with respect to factors such as retention, comprehension, and the outcomes of subsequent actions.

Five principles are presented as examples, all of which are of importance for TC (see Villiger 2019, 178-180):

- Coherence principle: Language and visualisation are semantically linked (Mayer 2021³, 143–165).
- Signaling principle: The link between language and visualisation is displayed (Mayer 2021³, 166–185).
- Spatial Contiguity Principle: Related multimodal content is placed in spatial proximity (Mayer 2021³, 207–165).
- Temporal Contiguity Principle: The related multimodal contents are communicated simultaneously. (Mayer 2021³, 227–242).
- Redundancy principle (Schnotz 2014, 88-89): When processing content, the prior knowledge of the respective users must be taken into account. Only users with little prior knowledge benefit from a redundant presentation of language and visualisation. Users with extensive prior knowledge are more likely to be hindered by the processing load of redundant content.

The redundancy principle is especially noteworthy in the context of TC applications targeting professionals. Here it becomes clear that the application of the principles must always be conceived from the respective target group.

There are relatively few publications from the disciplines of instructional design and instructional psychology. Due to the proximity to CTML, the delimitation of instructional design in particular (cf. introductory presentation on instructional design in Niegemann 2008) is sometimes quite difficult. In brief, both approaches share the common goal of optimising learning through didactic principles. An important model of instructional design that focuses on multimodality is the Four Component Instructional Design (4C/IC) by van Merriënboer/Kester (2014). This model holds particular relevance to TC since it takes into account the distinction between descriptive and instructional content, a key consideration in TC (cf. Villiger 2019, 180-182).

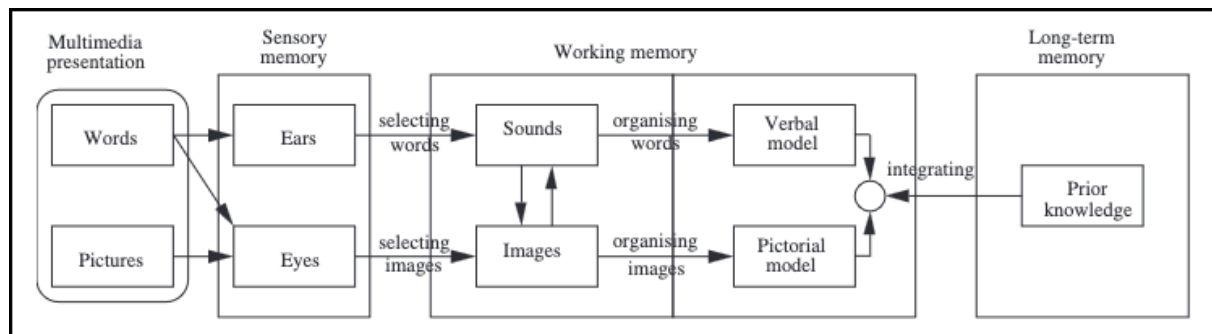


Fig. 2: Cognitive Theory of Multimedia Learning (Mayer 2010, 545)

Criticism of CTML mostly emphasises the oversimplification/lack of granularity of the approach. Austin (2005, v) and Bateman/Schmidt-Borcherding (2018, 2) emphasise that only individual combinations of modalities are tested in the studies. Austin (2005, pp. v-vi) also underscores that, in some cases, differences in subjects' cognitive abilities, such as spatial perception and prior knowledge, are not assessed beforehand. In addition, too little attention is paid in CTML to the respective user interface, despite the potential to mitigate or even eliminate the drawbacks associated with individual modalities (Austin 2005, pp. v-vi; see also the study by Erhel/Jamet 2006 on enhancing the learning effect through the use of pop-up windows).

In order to limit the large selection of publications, especially in the field of multimedia learning, the bibliography covers the following focal points:

- Basic literature on CTML provides background knowledge and thus a better classification of studies based on this approach.
- Preference for meta-studies: CTML is an evidence-based empirical approach. Individual studies are helpful for further research into a question, but they should not be used as the sole basis.

Two additional selection criteria are grounded in their relevance to TC:

- The subject of the study is close to the technology/product and/or instructional situations are examined that are similar to those in TC.
- The subject of the publications are genres of interest to TC (for the definition of genres, see chapter 2.2).

Taking into account the above-mentioned weaknesses, the psychological approaches offer an excellent basis for dealing with questions of TC. In some cases, publications from other disciplines confirm the respective research results, resulting in a kind of triangulation (cf. chapter 2.2).

2.2 Multimodal Linguistics and Social Semiotics

As a second foundation, research from the fields of Multimodal Linguistics and Social Semiotics is presented. Both approaches draw upon the principles of Systemic Functional Grammar

(SFG) according to Halliday (e.g., Halliday 1978). In these approaches, language is viewed as a tool of social semiotics. It is based on three metafunctions (modes of meaning) of language that are communicated simultaneously (Halliday/Matthiessen 2004³, 29-31):

- Ideational function: experiences/perception of the world
- Interpersonal function: relationship between the communicators
- Textual function: structuring the communication context

Against the background of these basic functions, SFL provides a comprehensive system for analysing and elucidating the utilisation of semiotic resources across various contexts. A project team led by Bateman (e.g., Bateman 2014, 2017, Bateman et al. 2004, 2021) has effectively introduced this approach to the field of German linguistic multimodality research.

For the exploration of multimodality in TC, three focal points can be developed based on the approach:

1. Development of an empirical approach to multimodality
2. Role of materiality and genre concepts in researching multimodality
3. Unified approach to multimodal analysis of language and visualisation

Bateman (2022a, 43-47) has presented a compelling demonstration of the variations in multimodality approaches across various disciplines, a phenomenon that frequently impedes the progress of an empirical approach to multimodality. He therefore demands that the question pursued in each case should determine the choice of methodological approach and that, as a consequence, the respective home discipline should at least partially recede into the background (Bateman 2022a, 47). He envisions achieving this by triangulating research results across diverse disciplines, where well-established findings in one field should be translated or examined in a corresponding manner within another discipline (Bateman 2022a, p. 52). Additionally, it is recommended to provide corpora that can be shared among researchers in the field of multimodality. To facilitate this, an annotation manual for artefacts with text and static image from the Genre and Multimodality project is offered (Hentschel 2014) along with a reference to the annotation software ELAN (Max Planck Institute for Psycholinguistics 2022) for media analysis.

Another of Bateman's calls for improving empirical methodology in multimodality research is to analyse the materiality of the object of study (Bateman 2022b, 65). A rough grid of four dimensions is proposed, which can be further refined if necessary (Bateman 2022b, 65):

- Temporality: static versus changing objects of study
- Space: two-dimensional, three-dimensional
- Transience: for example, interchangeability of objects (e.g., Augmented Reality)
- Participation: role of the users (e.g., outside, interacting, alternating)

This approach presents numerous benefits for application-oriented research in TC. When designing information products, at least temporality and space are taken into account for cost reasons alone. Additionally, the other dimensions play a pivotal role in shaping the concept of an information product and directly impact its complexity.

While materiality aims at the realisation of multimodal artefacts, the term genre is about conventionalised, often temporally limited forms of communication that exist in a community. Bateman (2014, 258) defines it as follows:

[...] temporarily stabilised, conventionalised and structured bundle of planning results for communication among a community of users.

The foundation of conventionalization lies in the respective socio-functional communicative objectives of different genres (Bateman 2017, p. 227), but they also address the expectations of the recipients (Kostelnik 207, 266). The semiotic modes in which a genre is realised depend on the rhetorical strategies characteristic of the genre in question (Bateman 2014, 258). This broadens the focus beyond artefacts with traditional text-image combinations, which are primarily discussed in linear genres (e.g., instruction manuals, WWW pages, tutorials). Consequently, this approach allows for the inclusion of genres implemented through videos (e.g., instructional videos) or non-linear genres (e.g., online help) in the genre classification.

The focus of the study of multimodality in social semiotics will be illustrated by the example of the definition of genre by Kress (2009, 113), one of the most important representatives of the approach:

[...] names and 'realizes' knowledge of the world as social action and interaction – that part of the social world which is about my actions in interrelation with others, in social relations [...]

In contrast to the discussed definition by Bateman, which primarily originates from the conventionalised outcome and the underlying socio-communicative functions, Kress focuses on the social action, interactions, and their connections to individual activities and relationships. Accordingly, a forthcoming anthology, for example, addresses multimodality against the background of the social phenomenon of online and offline shopping (Rasmussen/van Leeuwen (eds.) 2024).

Another important aspect of the publications from Multimodal Linguistics and Social Semiotics is that central basic works and several studies place visualisation in the foreground. In the context of Social Semiotics, one such publication is the previously mentioned "Reading Images: The Grammar of Visual Design" by Kress/van Leeuwen (2021³). Within the project group led by Bateman, there is also a growing emphasis on videos (Bateman/Schmidt-Borcherding 2018; Bateman et al. 2021). This shift towards visualisations is important, as access to multimodal artefacts is often still language-based, especially in basic research.

For the selection of literature relevant to TC, the above-mentioned basic literature in particular is taken into account in the bibliography. This is supplemented by numerous individual works that hold relevance for TC in terms of their subject matter.

2.3 Information Design and Visual Communication

The predominantly visual approach to multimodality is offered by the disciplines of Information Design and Visual Communication. Common foundational elements can be highlighted, such as aspects of perceptual psychology (including memory) and the laws of design theory. These foundations belong to design curricula, but even introductory and survey works (e.g. Tufte 1990⁶) are largely limited to visual representations. One exception is Alexander (2013²), who devotes two chapters to the examination of text-image relations (Alexander 2013², 63-98). Of particular interest are the factors she identifies that shape the interplay between text and image (Alexander 2013², 87-98):

- Leading medium
- Presentation medium und format

Based on the respective design concept, it is decided whether the text or the image should be used as the lead medium. The difference to the additional medium (Alexander 2013², 87) lies in the focus of the content (more information) and the positioning (in horizontal arrangement on the left, in vertical above). The presentation medium (printed or display/screen) and format (layout specifications) also have a significant influence on the respective design concept and thus on the question of which text-image relations can be implemented (Alexander 2013², 91-92).

The boundary between Information Design and Visual Communication is fluid, in some cases the two even appear equivalent. Albers (2003, 4) emphasises the holistic approach of Information Design and at the same time brings the exploration of human factors to the fore as an essential aspect of the discipline (Albers 2003, 5-6).

The literature research on publications on multimodality in TC that are interesting in these disciplines was mainly done by searching for genres in which text-image relations are to be expected. Notably, information graphics and diagrams hold significance, with discussions on the interactive implementation of both genres, among other topics (e.g., Weber, 2017, for interactive information graphics, and Stahl-Timmins, 2022, for interactive diagrams). Furthermore, individual research papers describe the utilization of moving images (e.g., Spinillo, 2016) and auditory signals (Edworthy, 2017; Sanz-Segura et al., 2022).

In terms of directly applying research results to TC, it's worth noting that there is a limited presence of findings from the realms of Information Design and Visual Communication.

However, there are notable exceptions, particularly in the medical field (e.g. patient information, data visualization for quality management in hospitals), both included in the bibliography.

2.4 Human Computer/Maschine Interaction (HCI)

The inception of interactive digital information products within TC can be traced back to the realm of software documentation, closely entwined with the domain of Human Computer Interaction (HCI). Accordingly, there is a close relationship to the research discipline of HCI. When exploring the field for contemporary user support, one comes across numerous works on dialogue systems that are designed as chatbots/voice assistants. Works that shed light on current knowledge prove highly valuable (e.g., Caldarini et al. 2022), especially for chatbots designed to provide automated assistance. The approach of making chatbot responses multimodal is also exciting. Liao et al. 2018 present a chatbot whose answers are illustrated by images. While there are only a handful of publications addressing the application of multimodal chatbots directly within TC (Azevedo et al. 2023; Bohus/Rudnicky 2005; Chen et al. 2021), they offer promising insights.

Overall, it is quite difficult to compile the work relevant to TC from the large number of research papers in this discipline. This difficulty arises not only from the sheer number of papers that are indexed under individual keywords, but also from the fact that the majority of research in this field places more emphasis on product design, such as user interfaces, rather than on user support. Occasionally, such work is also included in the literature management database, especially when terms are introduced that may become relevant to TC in the future.⁴

2.5 Technical Communication (TC)

The conventional approach to multimodality in TC is based on the perspective that text comprehension is supported by visualisations. Ballstaedt (1996, 192-193) introduces the functions of visualisations as illustrating, spatially orienting, identifying components and condensing information for TC and describes the conceptual processing of images in relation to text within usage texts (Ballstaedt 2017, 149). In addition, there are information products that typically necessitate the (preferably) simultaneous consumption of both language and visual content. These include moving images (e.g., videos), but also illustrations with captions.

With a view to the digital context of use, the examination of digital information products in TC initially lies in the area of software documentation. As early as 1985, research projects were

⁴ This includes, for example, the term microinteraction. While Saffer (2013, 2) starts from the content and describes the microinteraction as a functionality of a product that supports only one action (e.g., switching on a product), Ashbrook (2010, 1) aims for a microinteraction to last only four seconds from start to finish.

being developed on the use of online help to support the use of software programmes (Carliner 2010, 31). To this day, online help is provided by manufacturers as a digital, non-linear alternative to printed instructions for use. However, according to Bucknall/Mangrum (1992, 547), the popularity of online help is limited.

This initial situation is changing, at least partially, with the use of mobile devices. It is now recognised that help support must be designed independent of location and even independent of product presence. The prerequisite for this form of support is that information is contextually selected by the respective mobile device and presented to

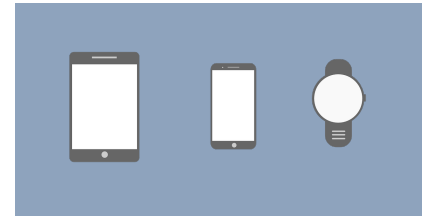


Fig. 3: Examples of mobile devices

users appropriately (Broda et al., 2013, 8). In the context of multimodality, the question arises as to how interactive digital information products are displayed on the screen. Accordingly, works from the field of TC highlight aspects of multimodal implementation in mobile TC in particular (e.g., Schmeling 2015; Schmolz 2014). Villiger (2019) draws a connection to CTML and the model of van Merriënboer/Kester (2014) and applies the postulated principles to information products of TC in the digital context of use.

As in other disciplines, access to relevant literature in the field of TC is facilitated through various genres. The central focus lies on the multimodal design of instructions, as elaborated in tab. 2 in chapter 3.2.). In the digital context of use, dynamic visualisations (e.g., animation, video) are particularly important alongside static ones⁵. Consequently, special attention is given to genres within our discipline that rely on dynamic visualisations. These include instructional videos, which are widely available on platforms like YouTube, primarily due to their success as user-generated content (UGC). In order to support the requirements of practitioners, strongly application-oriented publications are also recorded. In the case of instructional videos, this encompasses resources like the 'eight guidelines for creating videos for software training' by van der Meij and van der Meij (2013). Kadelbach/Schmeling 2020 also discuss the integration of text in instructional videos in a practice-oriented manner. The importance of the instructional video genre in TC is further underscored by the establishment of a distinct genre, known as the utility film, for a transitional period (e.g., Schmolz 2010).

Dynamic forms of media implementation such as animation and Augmented Reality (AR) offer even more support for users. In an animation, for example, instead of a caption, the respective information can be displayed by a mouse-over effect (written or spoken). Schober (2010), for example, provides a practical approach to implementing animations. Publications on the implementation of AR in TC were also specifically sought. Han et al. (2022), for example, show

⁵ Accordingly, acoustic signs now play a role alongside with verbal and visual ones.

in their study that AR information products are superior to 2D presentations with regard to the learning effect. Gattulo et al. (2017) propose an approach to replace text-dominated information products with AR.

In contrast to AR, Virtual Reality (VR) is currently relatively rarely used in TC. Based on the research, at least three publications on this medium can be provided. A publication in which safety training is implemented with VR is likely to be of particular interest for TC (Haj-Bolouri/Rossi 2021).

Standards are of particular importance in TC. Accordingly, the bibliography shows standards in which multimodality plays a role (e.g., DIN EN ISO 9241-110). For TC in Germany, the publications by Heuer (2010, 2011), addressing legal questions concerning documentation through various media information products, should also be of interest.

3 Implementing the bibliography as a Zotero group library

The bibliography is realised as a group library 'Multimodality in Technical Communication (TC)' in the literature management programme Zotero (https://bit.ly/multimodality_in_tc). The description of the functionalities of the Zotero literature management programme in the following chapters is limited to special aspects of the group library. Comprehensive documentation on Zotero can be found in English at <https://www.zotero.org/support/>. If you have problems, a search in the Zotero forums at <https://forums.zotero.org/> is helpful.

3.1 Structuring of the group library and availability of publications

Zotero is freely available as open-source software⁶, compatible with desktop operating systems (Linux, Mac, Unix, Windows) as well as web-based platforms, offering synchronized access for mobile and collaborative endeavors. There are some search and export options in the web view (e.g., Bibtex or RDF; selection of entries, entire collections, but not the entire group library). If you use Zotero as a desktop application, the entire group library can be integrated into your own literature management.

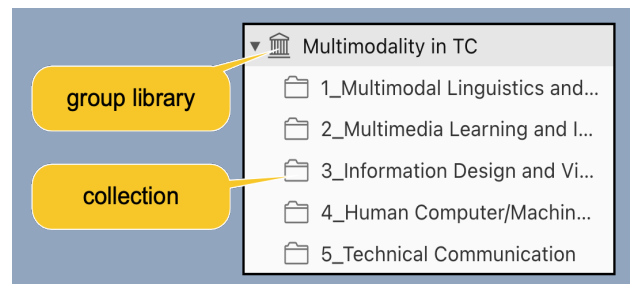


Fig. 4: Group library collections (web application)

The group library consists of five collections containing publications from the disciplines described in chapter 2 (see also fig. 4). Searches can be carried out across the entire group library as well as within individual collections.

Many publications can be assigned to several disciplines. By pressing the control key (Windows) or the alt key (Mac), one can see which approaches play a role

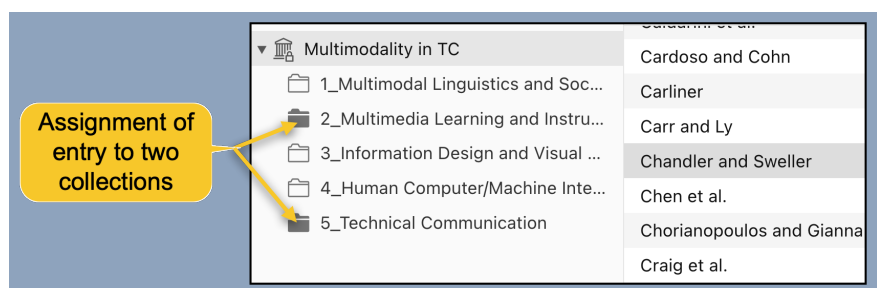


Fig. 5: Assignment of an entry to several collections (web application)

⁶ Download at <https://www.zotero.org/>; the free storage volume on the WWW is limited to 300 MB (Adam et al. 2021⁶).

in the respective publication (see example of a publication by Chandler and Sweller 1991 in fig. 5).

The Zotero literature management programme offers the common entry types and fields of a literature management. If the URL field is filled, it means for the group library Multimodality in TC that the entry is available free of charge to all. The entry of a URL in the archive field indicates that members of Hannover University of Applied Sciences and Arts can access the full text via the library's licence.

In the web view, the abstract entry field is displayed separately so that even longer abstracts can be entered quickly. If publicly accessible, all abstracts have been added (in part also manually). In this way, users of the group library can easily find out about the contents of a publication.

3.2 Search options and index categories

The search options of the web and desktop applications of Zotero differ considerably. The web application offers only a basic search for authors, publication year, title, and index entries (tags in Zotero). The latter are displayed in the lower area and can be conveniently filtered. The other search option, Full-Text Content, apparently does not refer to the contents of the database, but to full-text documents that can be attached to databases. For publicly accessible databases such as the group library, linking to full-text documents is not possible. Consequently, the full-text search yields no results.

In addition to a simple search, the desktop application has an advanced search in which fields can be searched specifically (cf

. fig. 6). Combined search queries can also be created across different entry fields.

To access the bibliography, 101 index entries in English are provided. For just under half of the entries, the allocation of the following categories is done:

- medium
- genre
- study
- tool
- target group

Tab. 1: Media analysed in publications

medium	no.
animation	27
auditory signaling	4
augmented reality	17
chatbot/conversational agent	10
diagramm	8
exploded view	2
gesture	7
haptic signaling	2
illustration	5
interactiv digitale display	4
mobile device	10
online help	2
pop-up window	1
screencast/screenshot	10
spoken language	16
table	3
video	22
web page	3

The categories are based on the idea that it is useful for researchers and practitioners to access publications related to these categories.

The list of identified media discussed in the publications (cf. tab. 1) reflects the research bibliography's focus on moving images (e.g., animation, video) and spoken language. Classical media, such as tables, hardly appear at all, as they are not dealt with much in current multimodality research.

As shown in chapter 2.2, the respective genre is central to multimodal implementation. In the publications surveyed, 30 different genres are addressed (see complete list of all genres in the appendix).

Table 2 shows nine genres that are particularly interesting for TC. As expected, the superordinate genre of instruction is very frequently represented, while specific genres such as assembly instructions appear in only one publication. The elaborations on the genre warning are partly not in conformity with standards (e.g., Clark/Lyons 2011, 196) and therefore they are rather not suitable for TC.

Of particular interest to both researchers and practitioners are certain types of studies. The evaluation of the publications shows (cf. tab. 3) that understanding under different multimodal conditions is most frequently investigated. It also becomes clear that it would be beneficial to conduct further meta-studies. Occasionally, these studies also examine the implementation of the described action by the participants (Alexander et al. 2016). The categories tool and target group are introduced, although only very few publications can be assigned to them. On the one hand, they support the targeted search, and on the other hand, there is hope that further index entries can be included as the research bibliography grows.

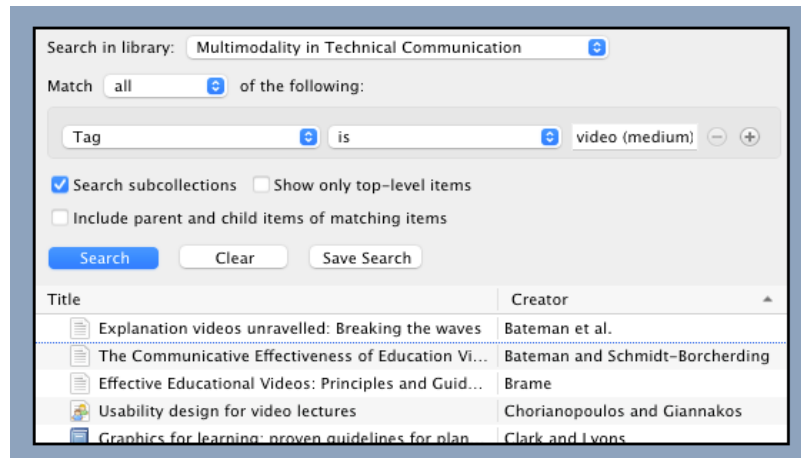


Fig. 6: Advanced search in Zotero (desktop application)

Tab. 2: Instructional genres discussed in publications

genre	no.
assembly instructions	1
device description	3
information graphic	5
instructions	50
maintenance instructions	7
quick start guide	3
software demonstration video	1
software documentation/tutorial/training	11
warning	4

Tab. 3: Study types applied in publications

study type	no.
meta-analysis	6
Retention study	11
reception study	19
comprehension/learning study	32

The tool category is applied to a total of 14 publications. It includes annotation software (e.g., Max Planck Institute for Psycholinguistics 2022), specifications for annotation procedures (e.g., Dahl et al. 2015) and empirical data sets (e.g., Caldarini et al. 2022).

Many publications in the disciplines of multi-media learning and instructional design/instructional psychology refer (at least implicitly) to the target group of learners.

Otherwise, the target groups of the respective multimodal objects of study are rarely specified in the publications (see overview

in tab. 4). Very few of the publications included in the research bibliography describe the potential of multimodality to support addressees with disabilities (e.g., Kim/Lane 2019; Falk et al. 2021). In-depth research on this topic was not conducted, as these works mostly focus on the translatability/adaptability of information products. This would have exceeded the time frame of the research project.

Tab. 4: Target groups addressed in publications

target group	no.
elder person	1
hearing impairment	1
lower education	1
manufacturing	1
mechanic/technician	3
novice	3
visual impairment	1

4 Further development of the bibliography

A great hope of the author is that the bibliography will be developed collaboratively. This implies an opening of the spectrum, the only restriction being that publications should be relevant to multimodality and instruction. Interested parties are welcome to contact the author by e-mail (claudia.villiger@hs-hannover.de), who will grant them permanent write access to the group library. To facilitate research in the group library, publications should be indexed according to the proposed keywords (see appendix). This task can, of course, also be undertaken by the author herself. Finally, in order to promote interdisciplinary cooperation, three research aspects are mentioned as suggestions that could be of particular interest.

Currently, the group library contains only ten publications explicitly addressing User Experience (UX), even though UX research is often situated in a multimodal context. Moreover, UX is inherently interdisciplinary, making further development of the bibliography in this direction desirable.

The visual emphasis placed in the fields of Information Design and Visual Communication is of special significance, as language is often still classically assumed to be the leading medium in many information products. In order to promote cooperation here, publications that originate from the medical field seem interesting (cf. chapter 2.3).

The third aspect concerns the potential of multimodality to support individuals with disabilities. Such publications are currently scarcely considered due to the time constraints of addressing translation/adaptation in a multimodal context as a theme. At the same time, this very relevant research aspect would also promote interdisciplinary collaboration.

These are just three ideas. The author is confident that users of the bibliography can enrich it with numerous exciting fields of research.

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Appendix: index entries (tags) of the group library

Tag	Tag
A	E
advertising (genre)	educational/instructional animation (genre)
animated agent	educational/instructional AR (genre)
animation (medium)	educational/instructional video (genre)
annotation (tool)	educational material
artificial intelligence	elder person (target group)
assembly instructions (genre)	empirical methods
auditory signaling (medium)	exploded view (medium)
augmented reality (medium)	expository (genre)
B	G
C	gesture (medium)
chatbot/conversational agent (medium)	H
classification of educational objectives	healthcare information (genre)
classification of language-visual relations	hearing impairment (target group)
classification of media	hypermodality/non-linearity
classification of signs	I
Cognitive Load Theory	iconic versus symbolic representation
cognitive principles – learning outcome	information graphic (genre)
Cognitive Theory of Multimedia Learning	illustration (medium)
comic (genre)	instructions (genre)
comprehension/learning	Instructional Design
comprehension/learning (study)	instructional graphic (genre)
D	Interaction
dataset (tool)	interactiv digital display (medium)
definition genre	K
definition medium	L
depicting code/representation	Law
descriptive representation	leading medium
device description (genre)	lower education (target group)
diagram (medium)	
dialogue analysis	
directing code	

Tag	Tag
M	S
maintenance instructions (genre)	safety training (genre)
manufacturing (target group)	science presentation/publication (genre)
mechanic/technician (target group)	screencast/screenshot (medium)
medical consultation (genre)	screencast tutorial (genre)
medical instructions (genre)	software demonstration video (genre)
meta-analysis (study)	soft. documentation/tutorial/training (genre)
mobile device (medium)	speech act theory
multimodal annotation	spoken language (medium)
multimodality application	Systemic Functional Linguistics
multimodality foundation	T
N	table (medium)
novice (target group)	U
O	usability
online help (medium)	user experience
P	user interface
patent (genre)	V
patient information leaflet (genre)	video (medium)
phone call (genre)	video annotation
pop-up window (medium)	video game (genre)
presentation slide (genre)	video lecture (genre)
prior knowledge	virtual reality
product description (genre)	visual display
Q	visual impairment (target group)
quick-start guide (genre)	visual types in technical communication
R	W
readability	warning (genre)
reception (study)	web page (medium)
research interview (genre)	X
resemiotization	Y
retention	Z
retention (study)	