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Research article

The Gendered Language of Technology

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Abstract

The aim of this article is to examine the partly unquestioned notions of how to ask about technology use and gender in a socio-cultural historical community of the 1950s-1980s with a focus on education. For in this defined historical and systematic framework, the connection between technology - language - gender, which is central to industrialized nations, becomes apparent for the first time. Accordingly, two problematization discourses come into particular focus: 1) Historically: How have different meanings of gender and technology manifested in Western discourse in the 20th century and thus continued into the present? 2) Philosophically: How have self-perceptions of gender in individuals been shaped by technology-related language? Where can we recognize interpretative sovereignties in the linguistic images and terminologies and what are the conditions and premises for this? Without the perspective on scientific history, philosophy and continuity, the current digital gender gap, as decidedly highlighted by the D21 initiative, cannot be understood and problematized in its complexity and historicity. The aim is to use a dual approach to contextualize and reflect on ideas of technology and gendered characteristics in linguistic images, as otherwise 1) language determines our approach to technology too hastily and 2) language can only be used in a standardized way. Self-attributions of actors in technology-related language images are historically contingent and systematically processed. Language use can become as a self-fulfilling prophecy and manifest (self-) conceptions such as “women understand less about technology” or “women cannot use technology” and thus expose people and entire groups to discriminatory social practices.

Keywords: Gender; Language; Quantification; Computer education; Gender gap

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Научная статья

Гендерный язык технологий

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Аннотация
Цель данной статьи – рассмотреть частично не подвергавшиеся сомнению представления о том, как исследовать использование технологий и гендер в социокультурном историческом сообществе 1950–1980-х годов, уделяя особое внимание образованию. В рамках этой определенной исторической и систематической модели впервые становится очевидной связь между технологиями, языком и гендером, которая является ключевой для индустриальных стран. Соответственно, особое внимание уделяется двум дискурсам проблематизации: 1) Исторически: как различные значения гендера и технологий проявились в западном дискурсе в XX веке и, таким образом, сохранились в настоящее время? 2) Философский аспект: как язык, связанный с технологиями, повлиял на гендерное самовосприятие людей? Где мы можем распознать интерпретационный суверенитет в языковых образах и терминологии, и каковы условия и предпосылки для этого? Без учёта научной истории, философии и преемственности современный цифровой гендерный разрыв, как это решительно подчеркивается инициативой D21, невозможно понять и проблематизировать во всей его сложности и историчности. Цель состоит в том, чтобы использовать двойной подход для контекстуализации и осмысления идей технологий и гендерных характеристик в языковых образах, поскольку в противном случае 1) язык слишком поспешно определяет наш подход к технологиям и 2) язык может использоваться только стандартизированным образом. Самоатрибуция акторов в языковых образах, связанных с технологиями, исторически обусловлена и систематически обрабатывается. Использование языка может стать самоисполняющимся пророчеством и манифестом (само)концепций, таких как “женщины меньше разбираются в технологиях” или “женщины не умеют пользоваться технологиями”, и, таким образом, подвергать людей и целые группы дискриминационным социальным практикам.

Ключевые слова: Гендер; Язык; Количественная оценка; Компьютерное образование; Гендерный разрыв

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THE DIGITAL GENDER/LANGUAGE GAP

One of the largest non-profit networks for the digital society, consisting of business, politics, science and civil society, Initiative D21, presented a study on the digital gender gap in January 2020, radically revealing the problem of gender and digitalization: There are serious differences between men and women in terms of access to digitalization, usage behaviour, skills and openness to technology. Even if it is not possible to speak of the woman as a collective singular with regard to socio-demographic aspects such as age, profession, education and place of residence, the study by Initiative D21 clearly shows that in all age groups and social classes, women are the "digital outsiders" in percentage terms, while men are the "digital pioneers" (Initiative D21, 2020). A closer look at the methodological approach of the study reveals that this result is based on statistical data collection, which is mostly carried out using questionnaires. The data therefore is based on external attribution and self-attribution of skills and traits realized through language.

The study was not so much about observing specific actions or skills in the field of technology. Rather, self-assessment, external attribution and meanings of gender-typical characteristics of technology use were queried in the empirical setting of the questionnaire. The answers were then labeled according to certain gendered terms and concepts. These self-assessments are expressed by the respective answers of the men and women surveyed in the study. The men and women use specific terminology for themselves and others when dealing with technology. This conveys the image of a fixed reality that is always based on language. Of course, this in no way means that the gender gap is only constructed or even fictitious, but rather that the gender gap is consolidated and reproduced by certain linguistic images and biases that are inscribed in the questionnaires and narratives, because they contain preconceived (mostly male) ideas of "technology" and "gender."

Language not only determines our socio-economic world, but also our technical world (Nordmann, 2020). At the same time, our language is becoming increasingly technical. We speak of information, gene codes, likes, values, feedback, performance, etc. (Kay, 2000). The above example illustrates the problem that this technical language not only has an ontological and anthropological level, but also a gendered level. Technical language (semantics, images, metaphors) only addresses certain individuals and not others. The combination of language and technology leads to the exclusion of non-male subjects.

The aim of this article is to examine the partly unquestioned notions of how to ask about technology use and gender in a socio-cultural historical community of the 1950s-1980s with a focus on education. For in this defined historical and systematic framework, the connection between technology - language – gender, which is central to the Western world, becomes apparent for the first time. Accordingly, two problematization discourses come into particular focus: 1) Historically: How have different meanings of gender and technology manifested themselves in Western discourse in the 20th century and thus continued into the present? 2) Philosophically: How have self-perceptions of women and men been shaped by technology-related language? Where can we recognize interpretative sovereignties in the linguistic images and terminologies and what are the conditions and

premises for this? Without the perspective on scientific history, philosophy and continuity, the current digital gender gap, as decidedly highlighted by the D21 initiative, cannot be understood and problematized in its complexity and historicity.

The aim is to use a dual approach to contextualize and reflect on ideas of technology and gendered characteristics in linguistic images, as otherwise 1) language determines our approach to technology too hastily and 2) language can only be used in a standardized way. Self-attributions of actors in technology-related language images are historically contingent and systematically processed. Language use can become as a self-fulfilling prophecy and manifest (self-) conceptions such as "women understand less about technology" or "women cannot use technology") and thus expose people and entire groups to discriminatory social practices.

The historically established self-assessments and attributions can only be adequately reflected upon and criticized if they are historically contextualized and philosophically reflected upon regarding technologized language. The dual approach of the present project therefore focuses on the genesis and validity of the instrument "language." The effectiveness of historical attributions must be demonstrated by particularly analyzing definitions and narratives inside technology discourse, some of which change and some of which remain constant. We have chosen schools as an analytical framework, as technology use is still linguistically gendered and quantified in schools and secondary education today. By deconstructing language in its historical contingency and its gender-specific attributions, one can fundamentally foster new ways of speaking and thus create gender-sensitive role models for technological competencies. This article thus attempts to point out the genderedness of technology education and reflect upon alternative approaches to tackle the disadvantage of girls and women. Historical critique yields productive philosophical impulses for thinking new gender-diverse role models that imagine a technologized world beyond the (gender) binary.

This paper therefore highlights in which ways a strong cultural gendering of technology as male came to be and how it contributed to women being denied access both educationally and socially, especially in the context of West German schools shortly after the introduction of the computer in education (cf. Steber, 2010, p. 125; cf. Faulstich-Wieland & Dick, 1989, pp. 37-39; 40). On the other hand, the paper will elaborate on how gendered binary self-images of male and female actors have been reproduced by specific uses of technology and stabilized through curricula (cf. Morgan, 1996, p. 119; cf. Rosenbichler & Vollmann, 1991, p. 20; cf. Zinnecker, 1975; cf. Weidenmann & Krapp, 1989, p. 631), while casting aside gender experiences and expressions beyond the binary.

Regarding the procedure, we begin with the state of research around gendered language practices regarding technology. Following this, we give some important definitions of terms and the presentation of our analytical framework. In the following section, we will then give an overview of gendering through and the genderedness of language in technology discourse before moving on to the relation of gender and technological semantica in the 1970s and 1980s. Therefore, we will present empirical gender social research by researchers such as Jürgen Zinnecker and Hannelore Faulstich-Wieland and Anneliese Dick and contrast it with the discourse of technophobia and techno-distance. Both these terms are central to the connection to the gendering of

technology-related language. Finally, we will discuss the scientific validity of the perceived female technophobia and techno-distance from a discourse-historical perspective.

DEFINITION OF TERMS: GENDER, LANGUAGE, AND TECHNOLOGY

One of the terminological cores of our analysis is the concept of gender. There are a multitude of approaches and theories around gender and sex. Gender and sex are now used synonymously, but many prefer gender as sex has a connotation related to a strictly biological connotation. It is contested whether a differentiation between sex and gender is even useful (see Smith 2010, p. 331; see Butler, 1993). Gender is therefore a category that is constructed on various levels from self-perception as well as external attributions, connotations, historically grown expectations and the actions of subjects. These processes construct a gender identity (cf. Herwartz-Emden & Braun, 2010, p. 231; cf. Paulitz et al., 2015; cf. Faulstich-Wieland et al., 2004; cf. Butler, 2019). In this respect, gender roles and self-perceptions emerge in interaction with a subject's environment. Belief systems, role expectations and socialization (family, education sector, media, peers) play a crucial role in this (Herwartz-Emden & Braun, 2010, p. 231). When children enter the school system, usually via elementary school, they experience "explicit and implicit expectations of gender-typical behavior" (Herwartz-Emden & Braun, 2010, p. 231, translated by us). However, families and the personal environment already intervene in the gender concept and impose their own expectations on a child, which makes life a gendered experience from the moment a subject's gender is declared after birth. The school system tends to reinforce gender knowledge that has already been taught and learned at home. In our work, we assume that gender and gendering/genderedness are fed by various social, interactional, historical, performance-related, linguistic and historically evolved ideas of what constitutes gender. Gender is therefore to be understood as a co-constructed concept of identity (cf. Oudshoorn & Pinch, 2003).

From a discourse-theoretical perspective, we understand language as a historical knowledge formation and dispositif (Foucault, 1977/1980, 2004). The language used shows what was historically speakable in the respective knowledge formation. Language is a formation system of knowledge segments. The epistemes, which are the subject of our discussion, are understood as a strategic dispositif that allows to filter from among all possible statements those that are acceptable within the discursive constraints – by this we don't necessarily mean scientific theory, but the creation of a certain scientificity based on which statements of truth or falseness are made. The episteme is the dispositif that allows us to distinguish not only between truth and falseness, but scientifically qualifiable from unqualifiable information (Foucault, 1980).

We want to understand language precisely as a "dispositif" because, according to Giorgio Agamben, the "dispositif" itself represents a heterogeneous totality which includes everything imaginable, whether linguistic or non-linguistic: discourses, institutions, buildings, laws, police measures, philosophical tenets, etc. (Agamben, 2009, p. 14). The power of the respective dispositif lies in seizing, directing, determining,

inhibiting, shaping, controlling and securing the gestures, behavior, opinions and speech of living beings.

When we talk about technology, we don't want to reduce it to individual things like computers; rather, technology forms networks, systems, or interconnected artifacts. As a rationalized and objectified form of problem-solving, technology was and remains a central element of social practice and, since at least the middle of the 20th century, has been instrumental in the constitution of the social sphere and thus gender (Oudshoorn & Pinch, 2003). Homo faber is closely linked to homo (etymologically understood as "man").

In Western androcentrism, the term "technology" encompasses both the skillset and knowledge about technical artefacts, thus implying an interdependent relationship of theory and practice. The compound term "technology" particularly shows how rationality, technology, and gender are intertwined, since rationality and logos in particular have historically had masculine connotations. Thus, as Fox Keller writes, there is the "widespread and deeply rooted superstition that portrays objectivity, reason, and spirit as masculine, and subjectivity, emotion, and nature as feminine" (Fox Keller, 1986, p. 13). "Technization" generally refers to "the spread of available techniques and technologies in social systems" and is thus closely linked to quantification and rationalization. Moreover, the terminological division into "hard" and "soft" sciences further proves this point of making up gendered dichotomies to categorize and hierarchize knowledge (cf. Paul & Wenk, 2020, p. 232). The measurable, "hard" sciences, which have male connotations and are often entrusted with machines, were thus given a higher status and taken with greater seriousness.

THE GENDERED LANGUAGE OF COMPUTER USAGE

As the history of science has been able to demonstrate since the debates on "science in context" (Shapin, 1996), knowledge does not exist in a vacuum but is determined by its historical context and therefore political. Ideas about gender have been cemented in research over the centuries. They have had an impact on our lives, which have been increasingly mechanized and computerized since the 1950s. Even though women always participated in the computerization of the world (for example, the "ENIAC girls"), they were usually denied the influence or importance of their work and/or their (primarily male) surroundings failed to mention their intellectual labor and contributions. This process was always also about the power relationship of naming. Whoever controlled the terminology controlled the discourse. The men were the signifiers, the women the signified. In the 1950s programming was considered "women's work" (see Terras & Nyhan, 2016). Men in the computer industry preferred to deal with hardware whereas women were mostly employed as "operators" or "assistants" at the keyboard of the "computer" – a term that even at the beginning was still used pejoratively for women as assistants for calculations. Programming was considered "clerical work" whereas the machine itself was perceived as a male domain (cf. Wajcman, 1991, pp. 29, 31-33).

During the software boom in the 1980s, the interest in software development and programming, which had previously been dismissed as simple "women's work",

increased drastically and was thus upgraded to an occupation of expertise while also becoming economic, epistemological and linguistic increasingly male-dominated and male-centered. This reflects the contingency of gendered ideas in society. In this case, it demonstrates how gendering as a powerful language instrument corresponds to market economy interests and dynamics.

In addition, the lack of gender-sensitive language theories in the 1950s and 1960s brought about the issue that women had very little confidence in their technological skills in the decades after WWII.

For our analysis we want to focus now on the topic of technology education and the extent to which gendered language and terminology have an impact on the gendered and cognitive performance-related self-perception and external perception of learning subjects throughout recent history. Education is an institutionalized form of directed learning and is usually practiced based on curricula. Curricula are not just written down instructions, but also contain ideology-driven ideas about intelligence, health, biology, gender and sexuality. In educational research, the term "hidden curriculum" was coined in 1968 by US researcher Philip W. Jackson and then adopted in German educational discourse under the term "heimlicher Lehrplan" (e.g. in Zinnecker, 1972 and Zinnecker, 1975). This concept entails the favoring of boys'/mens' areas of interest, giving them an advantage in terms of language and knowledge (cf. Ranftl-Guggenberger, 1991, p. 196). By virtue of prior knowledge through encouragement from families, boys convey a higher level of competence and intelligence and are in turn affirmed by teachers in their knowledge-level and self-confidence (Ranftl-Guggenberger, 1991, p. 196). Boys speak the technical language that is required for exams or other schoolwork. At the same time, they identify themselves as speakers and founders of discourse in this technical language. Minority groups such as girls and women, people with disabilities and immigrants are usually disadvantaged. The fact that teachers classify and evaluate pupils according to language attributions has been highlighted in the context of the "hidden curriculum".

TECHNOLOGY EDUCATION, TECHNOLOGIZED LANGUAGE AND GENDER IN THE 1970s AND 1980s

One of the first researchers in the German-speaking world to deal with the construction and history of gender role expectations by educational institutions was the education researcher and social pedagogue Jürgen Zinnecker. He made use of an interdisciplinary approach and researched childhood, youth and school (cf. Büchner & Zeiher, 2011, p. 1). In his work, he interpolated axioms of childhood pedagogy with feminist theory and psychology (p. 2). When he began his research in the 1970s, pedagogy in German-speaking countries was dominated by North American pedagogical approaches (cf. Mey, 2001, p. 7), first by behaviorism, then by cognitive psychology (cf. Epler, 2013; cf. Lück, 2009, pp. 80, 117, 179). In 1972, Zinnecker published "Emanzipation der Frau und Schulausbildung," a work that was widely received in educational science. In it, he examines the educational situation of girls and women in terms of their education opportunities from a Marxist-feminist perspective, making him the first person in West Germany to approach this problem from this viewpoint (cf.

Zinnecker, 1972, p. 30; cf. Faulstich-Wieland et al., 2004, p. 9). For Marx, language is an important characteristic of human societies. For him, its significance lies in the fact that people form their understanding of their world and themselves in language. At the same time, language takes a back seat to physically productive activity and its social organization; it is subordinate and dependent. „Die Ideen werden nicht in der Sprache verwandelt, so dass ihre Eigentümlichkeit aufgelöst und ihr gesellschaftlicher Charakter neben ihnen in der Sprache existierte, wie die Preise neben den Waren. Die Ideen existieren nicht getrennt von der Sprache.“ (Marx, 1953, p. 80)

In “Emanzipation der Frau und Schulausbildung” (1972), Zinnecker compiles an empirical and historical meta-study to demonstrate how gender and genderedness are co-constructed and reproduced in the world of education and technology. Zinnecker's sources are strongly oriented towards surveys (e.g. UNESCO; cf. Zinnecker, 1972, p. 49) as well as data and statistics collected on women, e.g. female students, trainees and pupils (pp. 50–60; 66–82; a comprehensive summary of various studies can be found on pp. 115–117 and p. 119, as well as on the evaluation behavior of teachers cf. pp. 125; 128). The data he examines in his meta-study is from the Weimar Republic, the Federal Republic of Germany, the German Democratic Republic, Austria, the United States, Great Britain and the Netherlands. Zinnecker researched how teachers display gender-specific language assessments of boys and girls (p. 119; 128), transfer and graduation rates by gender (p. 115-116), socio-economic background (class) (p. 156) as well as career, training and promotion prospects (p. 213). Zinnecker sees a preference for girls with “inconspicuous behavior”, which is positively confirmed by the social environment and leads to restraint in learning situations, thus disadvantaging them, especially in regard to the social demands of the job market (p. 226).

In addition, men were encouraged to pursue technological education and professions, while women were expected to follow socially and care-oriented career paths (Zinnecker, 1972, p. 217). This made it difficult for them to detach themselves from the reproductive role to assert themselves on the labor market and in science and demanded adaptation to “masculine” behaviors and language, which were not allowed to conflict with the expectations of femininity (pp.178-180). This “social character for its part is a reified expression of the prevailing division of labour between the sexes”, according to Zinnecker (p. 203, translated by us). He points out how the gender-related division of labor as a capitalist dynamic affects the educational context (pp. 203-208).

This is manifested through narratives of the (supposed) “nature” of women and men that are enshrined in the (hidden) curriculum (cf. Zinnecker, 1972, pp. 83-91). In “Emanzipation der Frau und Schulausbildung”, Zinnecker questions narratives of gender essentialisms and considers them to be justifying the dynamic of capitalism.

TECHNOCAPITALISTIC LABELING: “TECHNO-DISTANCE” AND “TECHNOPHOBIA”

In the 1980s, the home computer boom allowed middle and higher income households to buy computers at affordable prices (cf. Haefner et al., 1987, pp. 28; 64). Lower-income households often shared a single computer if they possessed one, which

had a negative effect on familiarity with computers and reinforced differences (p. 23). The self-perception of girls regarding technology, which problematically was labelled as "techno-distance" and/or "technophobia" in educational discourse, is also reflected in the choice of training and study subjects: from the post-war period until the late 1980s women tended to focus on caring, bureaucratic or manual professions and were (and still are) involved in domestic, caring and educational tasks that are mostly invisible and unpaid (cf. Böhmer, 2017, pp. 64, 97). Meanwhile, men dominated technical subjects, universities and entire fields of research as well as language and labeling. These labels have always been associated with socio-economic hierarchies and pay gaps. Despite being overqualified, many women opted more frequently for "typically female professions, which are both less well paid" and more precarious (Paseka, 1991, p. 165, translation by us; cf. Ranftl-Guggenberger, 1991, p. 191) and trusted each other's technological skills less (cf. Zwick & Renn, 1998, p. 63).

How language creates the world and self-awareness, but also socio-economic structures, is well illustrated by the example of the terms "technophobia" and "techno-distance". During the increasing computerization of the 1980s, both terms emerged in the technology and education discourse. It was postulated both in newspapers and in research that many women had a fear-based, distanced or uninterested attitude towards technology (cf. Haefner et al., 1987, p. 209; cf. Kahle, 1989, p. 96; cf. Schelhowe, 1999, p. 50 and Baumert, 1992, p. 83 for a problematization; Ranftl-Guggenberger, 1991 for an overview of Austria). The term "Technikdistanz" implies an (inherent) distance between women and computers. As has been previously shown, the reasons for this don't lie in some supposed essence of women, but in their socialization and lesser access to computers than men. Distances created by predominantly male in-groups in relation to technology, in particular around the computer, create linguistic demarcations to laymen, which further play into what is negotiated as "distance from technology" in women (cf. Haefner et al. 1987, p. 273) and reinforces prejudices.

For various reasons, computer science in particular has been a male-dominated field of research since its inception (cf. Haefner et al. 1987, p. 209). For example, Haefner et al. argue that men tend to think rationally, while women tend to think verbally, thus explaining men's preoccupation with rationalization processes through machines (p. 209). The authors go on to say that women are aesthetic-minded beings by nature and therefore have less interest in technology and a greater distance to technology. They state that women in information technology have often been assigned the "waste product[s] of male work" (p. 210). Despite recognizing these dynamics, the authors fail to mention the interdependence of these circumstances. Instead, they read an essentialist interpretation out of the technical disadvantage of women and thus exemplify the technology education discourse of the 1980s.

This example showcases how an essentialization of the presumably "different" relationship between women and technology was generated with specific language choices and narratives in scientific discourse. Some authors argue on an emotional-psychological level by postulating a fear of failure, embarrassment and/or contact with technical devices among women as well as an overtly critical stance towards technology (cf. Kahle, 1989, p. 96; cf. Haefner et al., 1987, p. 209). In addition, the essentialization

of certain supposed fears and familiarities entails a reinforcement of biological binarization, which implies a determinism between learning certain skills and gender and displaces learning subjects who deviate from it from the educational and technological discourse. To conclude, the term "Technikangst" is a discursive representation of gender binaries in the 1980s technology discourse, creating a rift between learning subjects and upholding the idea of male expertise in technology whilst pathologizing women's experiences and self-perceptions in a domain that has been historically male-exclusive and misogynist.

GENDER-AWARENESS AS LANGUAGE-AWARENESS

However, even in the 1980s there were critical and reflective studies on the self-description and external description of female and male actors in the use of technology. Methodologically and epistemologically, a study by Hannelore Faulstich-Wieland and Anneliese Dick should be emphasized here. Their study illustrates the educational context of gender and technology in the 1980s. "Mädchenbildung und neue Technologien" (1989) is both a gender- and language-sensitive educational study and the final report for a development project that was commissioned by the Ministry of Education and Cultural Affairs of the State of Hesse (HIBS) to teach pupils how to interact with new media in a reflective and critical manner (Faulstich-Wieland & Dick, 1989, p. 1). The study was conducted with eighth graders at two Frankfurt comprehensive schools and employed surveys, protocols, statistics, interviews and testing teaching concepts. The pupils were observed and questioned about their gender-related behavior in relation to mono- and co-educational computer-based lessons. The researchers were interested in how the school environment affects technical use and technological self-confidence between the genders as well as the differences between mono- and co-educational learning scenarios.

Gendered language use begins in childhood and is manifested in everyday school life. As Faulstich-Wieland and Dick (1989) demonstrate in their extensive study of various classes over a span of three years, most of the gendering in school takes place in linguistic practices. For example, boys frame themselves as technology experts while devaluing their female classmates. Therein, Faulstich-Wieland and Dick showcase how narratives of gender hierarchies and domination pervade in education practice.

Despite having computer skills, girls were more likely to verbalize gaps in their knowledge than boys, who in turn were more self-confident with the same level of knowledge (Faulstich-Wieland & Dick, 1989, p. 18). According to the surveys, female pupils assumed that boys were more computer-literate and reported discrimination by male classmates (p. 33). Girls also interpreted gender segregation (mono-ed) in computer-based lessons as an implication of lower computer skills. These factors had a structurally negative effect on female pupils (p. 26). Faulstich-Wieland and Dick conclude from this that gender-segregated lessons sometimes may provide a safe framework for experimenting with computers, but that the separation can also reinforce prejudices (p. 39). However, gender-neutral measures could also (re-)produce disadvantages by making them invisible (p. 1). According to the impression of the study, the prejudices lie mainly with the male pupils who, on the one hand devalued their female classmates and declared

them incapable, but on the other hand also felt a certain threat that the girls could catch up in a gender-segregated computer course and become competition (p. 38f).

The study found that girls felt a greater inhibition to pursue computer and information technology education (Faulstich-Wieland & Dick, 1989, p. 55). In some cases, they had internalized hegemonic male narratives that prevented them from using computers and lead them to regard computers as a male domain, which in turn affected their choice of subjects (cf. p. 70). In the study, some boys judged girls as "Weiber" (Pejorative term for "woman"), "unfähig" (incapable/incompetent), "dumm" (stupid) and "nur zum Kinderkriegen [geeignet]" (only fit for childbearing) when it came to computer use (pp. 20, 37–39). The latter pupil quote is an impressive example of the connotation of femininity with the ability of reproduction. The devaluation of girls led to low self-confidence in computer-related subjects (p. 21). Female teachers in technical and scientific subjects were also verbally discriminated against as pupils had less trust in and lower expectations regarding their abilities (p. 63).

Faulstich-Wieland and Dick partially refute the widespread assumption at the time that girls were inherently uninterested in technology and computers: instead, they highlight that many girls in the 1980s wanted computer access but were put off or discouraged by their environment and the technology-related language that denied them the competence to use technology. The researchers find that girls are more likely to cooperate and teach each other technical skills quickly. Studies like theirs show that female learning subjects rely on mutual, informal solidarity structures to progress in their learning. At the same time, in co-educational contexts they often experience devaluation from male peers, which is not always addressed by teachers or caregivers (Faulstich-Wieland & Dick, 1989, pp. 20; 37–39). In mono-ed lessons, as girls caught up on the rift between their and the boys' technology use, they developed a greater self-sufficiency regarding computer use, thus changing their self-perception and linguistic use of gendered technology frames. Faulstich-Wieland and Dick illustrate the importance of access and spaces for cooperative work with computers as well as teachers who take on a gender-sensitive model of teaching and speaking and function as role models employing a media-critical approach to computers.

CONCLUSION: IN SEARCH OF A NEW LANGUAGE IN A TECHNOLOGICAL WORLD

Current studies such as the D21 initiative demonstrate how strongly the digital gender gap is shaped by self-assessment, role models, and stereotypes. Social attributions (girls enjoy reading, boys play sports and are interested in technology and computers) have become enormously powerful, particularly regarding digitalization, and have become reality in the sense of a self-fulfilling prophecy (Fraillon et al., 2014). This article demonstrated how language creates a certain desired social reality, manifesting patriarchal power structures. Patriarchal social practice has shaped self-assessments regarding technology use and learning opportunities in schools as early as the 1970s, when computers were first introduced into learning environments, through androcentric labeling and narratives, as well as male-favoring language which in turn determines and

limits women's technology knowledge horizons. Building on this, various studies from the 1990s onwards show the unsurprising result that women tend to focus on traditional 'women's jobs' when choosing careers, even when they demonstrate above-average technical skills that would, in principle, open up a broad range of career opportunities. In this context, it is particularly important to question the dispositif of technological language, which plays a prominent role in all studies, because language

1) historically reveals a certain scientification of social observation, which in turn, especially in the 20th century, provides supposedly “objective facts” for social and political decision-making processes.

2) This historical problem also gives rise to a philosophical problem, namely that language is technically standardized, appeals to certain actors and encourages them to participate in discussions more than others.

As has been shown in this paper, numerous historically evolved notions of gender and associated gendering affect the technological learning and educational potential of girls and women. Social, curricular, political, financial and accessibility factors influence the language and with this the reality of learning to use computers, while media and research discourses are spun in which women are blamed for their own late inclusion into technological education, for example by attributing to them an inherent fear of technology. As noted at the beginning, there is a constant hierarchization in terms of gender. Similarly, the West German education system has inscribed binary and essentialist notions of gender, from cognitive performance to the operation of computers, and according to our observations so far, continues to promote these. Furthermore, non-binary or inter learning subjects do not take place at all, presumably because schools demand certain forms of gender socialization and learning subjects tend to behave according to expected roles in order to avoid disadvantages. In her famous Cyborg Manifesto, Donna Haraway showed that new technology makes it possible to find a new language beyond binary coding and the constant creation of dichotomies to imagine the potential of humanity through means of technology beyond restrictive ideas of gender. Perhaps the problem does not lie purely in technology, as technology-critical thinkers would have us believe, but in the androcentric notion of technology.

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