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Technological diversity: A cost-caving, person-centered alternative to systemic techno centric and technological provider bias

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Abstract

Fiscally-driven policies have created increasing pressures to utilize IT to access and interact with large public health agencies like Medicare, Medicaid, and state health insurance exchanges, as well as private insurers, hospitals, and large community clinics. This systemic technocentrism orientation effectively creates barriers to health care for less IT-fluent populations, which represent a significant percentage of the U.S. population. Population-based medicine also ignores individual differences, especially with regard to IT fluency. In clinical settings, technocentrism can produce unconscious technological provider bias, with consequent risk of engaging in technological microaggressions that can undermine the therapeutic alliance, resulting in poorer clinical outcomes, leading to subsequent episodes of treatment, and increasing the cost of health care. Technological diversity is suggested as a person-centered approach to viewing differences in comfort and proficiency with IT that conveys respect for experience of the less IT-fluent person, making health care more accessible. Functional assessment of comfort employing IT provides data that inform evidence-based decisions about how public and private health care systems, hospitals, and clinics communicate with patient populations. These data also inform treatment planning from a person-centered perspective, reducing technological provider bias, strengthening the therapeutic alliance, producing better treatment outcomes, and significantly reducing the cost of health care. Recommendations are made for future research exploring the concepts of technological diversity, technocentrism, and technological provider bias, and expanding the scope of IT assessment instruments with various populations.

Keywords: Technological diversity, Technological provider bias, Technocentrism; Technological microaggressions; IT-fluent

Introduction

The rapid advancement of information and communication technology (IT) over the past two decades transcends ethnicity, cultural background, age, disability, and socio-economic status (SES). It is perhaps the universal feature of the 21st century American experience. Over twenty years ago it was suggested that access to IT is a basic human right [1]. Nonetheless, access to and familiarity with IT are not equally shared among all members of the U.S. population. People with lower SES, members of specific ethnic and cultural groups, people with disabilities, and older adults utilize IT at a much lower rate than younger, well-educated, more affluent members of the population, so that a significant percentage of the population is less IT-fluent, and might be characterized as technologically marginalized [2-7]. Although overall IT utilization has increased over the past decade, these disparities remain largely unchanged [8].

Despite these data, large public health care systems including Medicare, Medicaid, and state health insurance exchanges, as well as private insurers, have increased pressure on subscribers to use IT (websites) in order to access or interact with them, effectively creating barriers to health care for less IT-fluent populations. Based not on data about target population IT fluency or accessibility, this technocentrism orientation derives from fiscal expediency. Similarly, population-based medicine fails to account for individual differences, especially with regard to IT fluency.

Historically, human services and IT literature have characterized low IT utilization as a deficiency or disadvantage to be remediated [9-18]. The assumption that people should be, or should want to become, comfortable and proficient with IT reflects an orientation that places a high value on IT proficiency. It is, de facto, value-laden. Value-laden assumptions are palpable to their recipient, and can be experienced as conveying disrespect. For human services providers, including independent practitioner psychologists, harboring assumptions (even unconsciously) that convey disrespect to clients can undermine the therapeutic alliance, leading to poor therapeutic outcomes [19,20].

In clinical settings, stronger therapeutic alliances and better therapeutic outcomes are achieved by adopting a more neutral, acceptance-based stance toward another person [21] and engaging the client as an active participant in treatment [22-26]. Improved communication with patients has long been shown to produce better health outcomes and increased ratings of satisfaction by patients and providers of care [27-29]. A technocentrism orientation can produce unconscious technological provider bias, with the consequent risk of engaging in technological microaggressions that can interfere with provider-patient communication, undermining the therapeutic alliance and leading to poorer clinical outcomes.

At both the macro level of large health care systems and on the micro level in clinical settings, a technocentrism orientation fails to seek or attend to important person-specific data, including IT fluency, that directly impact treatment outcome. Neglecting these data leads to poorer provider-patient communications, conveys disrespect to the patient which undermines the therapeutic alliance, and ultimately leads to poorer treatment outcomes. Poorer treatment outcomes leave clinical issues unresolved, leading to subsequent or repeated episodes of treatment. Ironically, although intended to contain costs, the technocentrism orientation at both the macro and micro levels ultimately increases the cost of health care.

Cost containment in health care relies on timely and effective treatment. Timely and effective treatment rely on access to care, and treatment specifically focused on the needs of and resources available to each patient. Reducing or eliminating systemic technocentrism barriers to care requires a system-wide change in understanding disparities in IT fluency, which can ultimately lead to significant reductions in the cost of health care. Clinically, improving treatment outcomes by obtaining and utilizing adequate data about individual patients' needs and resources as part of the treatment plan, including the conveyance of respect for the patient's relative comfort and proficiency with IT, also requires a different understanding of IT disparities that will also lead to an overall reduction in health care costs. The purpose of this paper is to provide a conceptual framework and lexicon for such an understanding, and specific recommendations for application of the concept of technological diversity to mitigate systemic technocentrism and technological provider bias in ways that can lead to significant cost savings for the health care system.

Disparities in IT Access and Utilization

Data from the U.S. Census Bureau [7] indicate significant disparities in home access to high speed internet associated with ethnicity, age, and household income.

IT utilization for people with intellectual and developmental disabilities is also much lower than IT utilization in the general population [3,30], despite efforts to engage young adults with intellectual disability with social media and other IT [5].

Table 1 IT Access and Utilization by Ethnicity: Data from [7]

Ethnicity	Access to Home High Speed Internet
African-American	62.50%
Hispanic	68.10%
White non-Hispanic	77.80%
Asian American	87.20%

Table 2 IT Access and Utilization by Age: Data from [7]

Age in Years	Access to Home High Speed Internet
18-34	79.20%
35-44	83.20%
45-64	79.10%
65 and older	59.20%

Table 3 IT Access and Utilization by Household Income: Data from [7]

Annual Household Income	Access to Home High Speed Internet
Less than $25,000	49.00%
$25,000 to 49,999	69.30%
$50,000 to $99,999	84.90%
$100,000 to $149,999	92.60%
$150,000 or More	95.30%

Equally affecting all Americans, regardless of ethnicity, disability, or SES, is the process of aging. The number of American adults over the age of 65 will more than double from 46.5 million today to over 98 million by 2060 [31]. By 2030, one in five Americans will be aged 65 years or older, and by 2060, nearly 25% of the population will be over 65 years of age [32]. Despite overall increases in IT use during the last twenty years, people aged 65 and older continue to utilize IT at least 20% less than younger age cohorts [4,6-8]. Protocols for mental health professionals working with older adults have not included technology per se as a specific area of assessment or treatment [33]. It is notable that the APA's 21 Guidelines for psychologists working with older adults does not specifically include familiarity with the assessment and treatment of technology challenges or barriers for older adults as a guideline (APA, 2014).

Although the overall rate of access to IT has increased for each ethnic, cultural, disability, SES, and age group over time, the pattern of disparity between groups today remains consistent with that reported over a decade ago by the U.S. Census Bureau and Bureau of Labor Statistics [7,34]. How these disparities are described and understood has an important bearing on the treatment of members of technologically marginalized groups.

The Digital Divide and Technological Diversity

Lloyd Morrisett of the Markle Foundation first coined the term the "digital divide," to describe the wide disparities in IT utilization between members of various socio-economic, ethnic, cultural, disability, and age groups [35,36]. The digital divide has not closed over the last decade [7,8,37].

The wide disparities in IT utilization between members of different SES, ethnic, disability, and age groups are not binary, as if there were only two groups: "high IT users" or "low IT users," as suggested by the term "digital divide." The data demonstrate a wide range of comforts and proficiencies with various IT applications. Without assigning or assuming value, the spectrum of comforts and proficiencies with various IT applications is more accurately described by the term "technological diversity."

It should be noted that the use of the term "technological diversity" in this paper as applied to human services is different from its use in the field of information technology (IT). In the IT field, "technological diversity" is used interchangeably with "technological diversification," meaning the diversification of technological companies or firms [38]. In the context of human services, "technological diversity" refers to the wide range of IT-fluency, comforts and proficiencies with various IT applications among various individuals and groups within the general population, as demonstrated by data, e.g., collected by the U.S. Census Bureau.

Consequences of Systemic Technocentrism and Technological Provider Bias

Over the past decade, large public health care systems including Medicare, Medicaid, and state health insurance exchanges have made websites the primary point of contact for accessing and communicating with them [39]. The shift toward online communications has been based on fiscal expediency: it is less expensive to host a website than it is to employ a large staff to answer telephone calls. The shift toward online communications was not based on any data indicating that the populations served by large public health care systems have IT fluency, or access to computers or high-speed internet. On the contrary, the specific populations served by Medicare (older adults) and Medicaid (people with lower SES) are those least likely to utilize the internet [7]. Effectively, the expectation of health care systems that their subscriber populations utilize IT in order to communicate with them not only reflects a systemic technocentrism orientation [40,41], but in fact creates a barrier to accessing health care. Eager to increase profits, private insurers have followed suit.

Population-based medicine similarly fails to account for individual differences, especially with regard to IT fluency. The American Medical Association defines population-base medicine as an approach "that allows one to assess the health status and health needs of a target population" [42]. Population-based medicine is also based on cost containment [43], making wide use of IT as the point of contact for "target populations," without assessing that population's IT fluency, and consequently creating barriers to health care through a systemic technocentrism orientation that neglects overlooks individual access to care, and what specific IT resources are or are not available to the patient that might facilitate their treatment.

Technocentrism can also occur at the point of patient contact with care providers in clinical settings. Higher levels of education and income are both correlated with higher rates of IT use [7]. Human services professionals are required to have a level of education above the national average, and their incomes are above the national average [7]. In addition, human services providers interact frequently with IT (e.g., online research, electronic health records or EHR's, email, listserv participation). The combination of these factors makes the human services culture's subjective "norm" for IT use higher than average.

Human service providers might be unaware that their IT-fluency (level of comfort and familiarity with IT) is not be shared by everyone. However unconscious, this technocentrism orientation and/or lack of awareness about technological diversity creates a blind spot, putting human services providers at risk for making unconscious assumptions either overestimating or underestimating a patient's level of comfort employing IT. These unconscious assumptions can be described as technological provider bias, analogous to racial provider bias described in social-cognitive psychology literature [44].

The technocentrism orientation interferes with the conveyance of respect for the person's level of IT-fluency. The absence of any guideline for routinely assessing IT comfort or proficiency among members of different SES, ethnic, disability, and age groups, reflects a systemic technocentrism orientation among human services professions, echoing the technocentrism orientation of large public and private health care systems including Medicare, Medicaid, state health insurance exchanges, and private insurers. Technocentrism interferes with provider-patient communications on both the macro (health care system) and micro (clinical) levels. Poorer communication, failure to convey respect to patients, and failure to engage patients as active participants in their treatment produces poorer treatment outcomes [21-29].

By disattending to person-specific data, including IT fluency, that significantly influence communication with patients, patient respect, and patient engagement in treatment planning, Technocentrism undermines the therapeutic alliance, producing poorer treatment outcomes and unresolved clinical issues leading to subsequent episodes of treatment, directly increasing the cost of health care. In this way, perhaps ironically, the technocentrism orientation of large health care systems intended to contain costs ultimately leads to increased costs for the health care system. How society, and human services providers in particular, interpret disparities in individual levels of comfort and proficiency with IT has significant implications for the ways in which members of technologically marginalized populations are treated, with consequences that include increased health care costs.

Technological Microaggressions

In the clinical setting, unconscious technological provider bias can manifest in the form of technological microaggressions. Psychiatrist Chester M. Pierce, M.D. first proposed the term "racial microaggressions" in the 1970's [45-47]. Since that time, the concept has been significantly explored and expanded [19,48-50]. Like racial, gender-based, or sexual identification-based microaggressions, technological microaggressions can occur in a variety of settings, including human service provision.

Technological microaggressions can create a psychological bind for the low-use IT person, who might feel demeaned without being able to specify why, while the perpetrator does not acknowledge wrongdoing because s/he is often unaware that their actions have been offensive or hurtful [19,50]. Examples of technological microaggressions include:

1)Microassualts: Conscious and intentional slurs, including technological epithets (e.g., "computer illiterate," or "Luddite"), or actions, e.g., giving preference to clients who access the human service provider's website or contact the provider electronically.

2)Microinsults: Verbal and nonverbal communications that subtly convey rudeness and insensitivity and demean a person's level of technological expertise. An example is a human services provider who requires new clients to complete registration materials or make appointments online (presuming high IT comfort and aptitude), or asks a client if there is someone who can help them do so (presuming low IT comfort and aptitude).

3)Microinvalidations: Communications that subtly exclude, negate or nullify the thoughts, feelings or experiential reality of a person uncomfortable with computer or internet technology. For instance, a human services provider might ask a person uncomfortable or unfamiliar with ICT how they can work or pay bills, conveying the

message that the person is not a part of mainstream society.

Microaggressions have been associated with lower academic test score performance [51], higher rates of depression and low self-esteem [52,53], weaker therapeutic alliances and poorer therapeutic outcome [19,20], and shorter life-spans [54]. With the possible exception of reduced longevity, all of these consequences directly increase the cost of health care.

Technological Diversity and Person-Centered Thinking

Viewing differences in IT fluency as technological diversity, and making use of data about each patient's IT fluency, is a person-centered approach [55]. In person-centered thinking, comprehensive treatment planning starts with comprehensive assessment of the patient's specific strengths, resources, impairments, and needs. Resources including health care professionals, family members, and community are drawn into a "circle" around the person [56], around whom different kinds of support are developed according to individual preference and need [57].

Person-centered treatment has been shown to improve outcomes and contain costs with a variety of populations including older adults [58], and older adults diagnosed with neurocognitive disorders [59]. In Great Britain, a care model specifically utilizing IT (e.g., email, text messaging, and social media) to create "digital circles of support" has been shown to reduce isolation, loneliness, and depression among older adults [60]. Person-centered care has been shown to produce better treatment outcomes and higher ratings of satisfaction by patients and providers of care [57].

A person-centered, technologically neutral stance conveys respect for the patient's current level of comfort and proficiency with IT, fostering a stronger therapeutic alliance and paving the way for better therapeutic outcomes through better communication, conveyance of respect to patients, and engaging patients as active participants in their treatment [21-29]. The technological diversity orientation is person-centered and inclusive, reducing the marginalization of members of low IT use groups. Using the language of technological diversity helps restructure thinking and expectations about each person's individual relationship with IT.

In an applied, clinical context, a person-centered, technologically neutral stance is difficult to achieve without objective data describing each person's relative level of comfort and proficiency with IT. This can be accomplished through the use of a brief intake assessment instrument, ideally completed by both the client and the clinician. Making relative IT comfort levels explicit reduces assumptions on both sides, elevates provider awareness of technological diversity, and reduces the risk of unconscious technological provider bias and technological microaggressions. Consistent with person-centered thinking, it clarifies whether the client wants to increase comfort and proficiency with IT, giving the client an active role in the development of the treatment plan and goals, and reducing that person's experience of marginalization. Establishing a therapeutic partnership in this manner conveys respect for client's personal goals and empowers the client as an active participant, rather than a passive recipient, of treatment, which is associated with better treatment outcomes [22-26] which ultimately reduce the cost of health care.

Assessing and Technological Proficiency and Comfort

Several instruments have been developed that assess a person's perception of their own proficiency with various technologies. Self-assessment tests designed for educators include the Technology Integration Self-Assessment [61] and the Technology Skills Self-Assessment [62]. Self-assessment test for workers in administrative and corporate settings include the Technology Skills Self-Assessment Survey [63] and the Technology Proficiency Self-Assessment Questionnaire (TPSA) [64]. There is even a self-assessment for Marriage and Family Therapists, the Comfort with Technology in MFT self-assessment [65]. A test has also been developed to assess stress induced in older adults by IT use [66].

To date, the only test designed for the general population as a brief, routine intake instrument that assesses the respondent's level of comfort utilizing IT is the Functional Assessment of Comfort Employing Technology Scale (FACETS) [67]. FACETS is the only assessment instrument that assesses IT fluency within specific functional domains, e.g., Social (email, text messaging, social media), E-commerce (online banking, bill payment, managing credit card accounts online), Travel (hotel reservations, airline, train or bus tickets, using apps or programs to get travel directions (e.g., MapQuest of Google Maps, using apps to get transportation (e.g., Uber or Lyft), and Home (managing files in one's computer, setting a wifi password at home, resetting a modem or router at home). Assessing each of these domains separately makes it possible to determine the individual's comfort utilizing specific types of IT. For example, a person might be very comfortable and proficient using email, text messaging, and social media, but might have low comfort and proficiency managing files in one's computer, setting a wifi password at home, or resetting a modem or router at home. By assessing each of these areas separately, FACETS provides more detailed and useful information (e.g., how a care provider or facility might most effectively communicate with a patient: email or text messaging, vs. an online "charting" system). FACETS is a newly published instrument, currently undergoing validation and reliability testing.

Addressing IT Disparities and Respecting Technological Diversity

Using scores from one of the instruments described above provides an objective basis for determining the respondent's level of comfort and/or proficiency utilizing IT. Assuming that a person with relatively low IT comfort and proficiency wants to become more IT comfortable and adept is an example of technocentrism thinking and possible provider bias. It is more respectful and considerate of technological diversity for the clinician to ask whether the person wishes assistance in one or more technological areas, or wants to become more comfortable and/or adept with IT.

In clinical settings, for the person wishing to acquire greater IT proficiency, the clinician can determine the extent to which the person might benefit from tutoring, coaching, mentoring, and/or personal instruction. Each of these interventions can be arranged in coordination with the various resources and other professionals supporting the person. These might include a local community or senior center, occupational therapy, and/or continuing adult education courses.

Among older adults, building greater comfort and facility with current technologies leads to increased feelings of efficacy and connectedness [68-70]. Older adults use of the internet has also been associated with less loneliness and lower levels of depression [8,71-75].

Large health care systems including Medicare, Medicaid, state health insurance exchanges, and private insurance companies can also make routine use of IT assessment in determining the most effective method for communicating with individual members of subscriber populations. Ratings of IT fluency can be used to inform decisions about using online communications, telephonic contact, or traditional postal mail to communicate with each patient. Improving communication reduces barriers to care, by making it more accessible. To obtain such data, health care systems would have to become more person-centered, assessing each subscriber's IT fluency. The cost of doing so would be more than compensated by the improvements in treatment outcome, directly reducing the cost of health care.

Conclusion and Discussion

The proliferation of IT has enormous potential for enhancing opportunities for people with disabilities, older adults, people with limited SES and members of specific ethnic and cultural groups. However, despite great expectations and active promotion of IT adoption among disadvantaged groups [5,70,76], the data demonstrate that the digital divide has not narrowed in more than a decade, so that members of these groups remain digitally marginalized [3,7,8,30,].

In fact, systemic Technocentrism has only increased over the past decade, and shows no sign of slowing down. Large health care systems including Medicare, Medicaid, state health insurance exchanges, and private insurance companies continue to increase expectations that subscribers utilize IT in order to access and make contact with them. Hospitals and large community clinics have adopted similar practices, also in the interest of cost containment. Population-based medicine approaches similarly neglect individual differences, especially in IT fluency, which impinges directly on access to care what resources can be mobilized in patient treatment. In the absence of data indicating each subscriber's IT fluency, these policies create barriers to health care. On the clinical level, providers of care can unconsciously demonstrate technological provider bias, engaging in technological microaggressions and other behaviors that convey disrespect to the patient, undermining communication and the therapeutic alliance, with consequent diminution of treatment outcome. Intended to reduce costs, practices reflecting a technocentrism orientation ironically lead to increased costs to the health care system.

Technological diversity is suggested as a way to change our cultural and societal assumptions about and expectations of low IT users. It promotes respect for the experience and disadvantage of technologically marginalized groups, and informs the language and thinking used in the culture of human services. Assessment of the individual's comfort with technologies is necessary to reduce systemic Technocentrism and technological provider bias, improve communication with patients, and consequently improve therapeutic outcomes [27-29,77]. As technology continues to evolve and technological diversity increases, identifying and quantifying disparities in IT comfort and proficiency are an increasingly essential part of an overall functional assessment of the person.

On the health care systemic level, acknowledging technological diversity and assessing IT fluency makes patient care more accessible. Population-based medicine could achieve better outcomes by including assessment of IT fluency for each patient, which could be used to guide evidence-based decisions about how to communicate most effectively with that patient, and what resources are available to the patient within and without IT. Hospitals and large community health clinics can use IT fluency data to determine how best to communicate with patients.

Within the clinical setting, learning the patient's technological strengths, weaknesses, and preferences informs the treatment team's options for providing assistance individually designed for the person. Increasing provider awareness of technological diversity and reducing technological provider bias also reduces the risk of technological microaggressions, which can interfere with the therapeutic alliance and lead to poorer treatment outcomes. Acknowledging differences in IT utilization and comfort as technological diversity affirms the experience of the client, rather than denying or invalidating it. Using language that indicates an understanding of and respect for differences in technological proficiency is a way of conveying respect to the person in treatment.

Conveying respect and understanding strengthens the therapeutic alliance, and empowers the client as an active participant in treatment, which is associated with better treatment outcomes [22-26], which ultimately reduce the cost of health care. Better communication between care providers and patients is also associated with better health outcomes and increased ratings of satisfaction by patients and providers of care [27-29,77-80].

In a broader social sphere, conveying respect and understanding means creating a culture of inclusion and acceptance. In an increasingly fractionalized society, fostering inclusion and acceptance is a critical undertaking. Further research is necessary exploring the concepts of technological diversity, IT-fluency, systemic technocentrism, technological provider bias, and technological microaggressions with a wider variety of populations.

Future research is also recommended evaluating the efficacy of technological assessment instruments, which will promote awareness of technological diversity, and provide useful information defining provider/client IT disparities, with value for reducing systemic technocentrism and technological provider bias. The employment of such instruments will help to increase awareness of technological diversity, reduce barriers to care created by systemic technocentrism, and mitigate technological provider bias in the assessment and care provided to a variety of populations. Increased understanding of IT disparities through assessment of IT fluency has broad implications for changing the policies of large public and private health care systems, hospitals, community clinics, and clinicians that guide the assessment and involvement of patients in treatment, improving treatment outcomes, and significantly reducing the cost of health care.

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accepts accountability for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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