

Computer Networks and Worldwide Integration

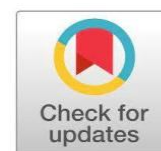
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Abstract: Communication and information computer networks connect the world in ways that make Worldwide Integration more natural and unfairness slighter. As educators, we look at these phenomena holistically analyzing them from the realist's view, thus exploring tensions, (in) fairness and (in) honesty, and from the idealist's view, thus implementation connectivity, union and development of a collective awareness. In an increasingly market driven world we find examples of openness and human kindness that are based on networks, specifically the Internet. After addressing open movements in publishing, software industry and education, we describe the possibility of dialectic equilibrium between Worldwide Integration of endemism, indigenusness, and autochthony in view of ecologically designed future smart networks

Keywords: Computer Networks, Internet, Open Access, Open Source, Open Education

INTRODUCTION

The process of testing pharmaceutical products must comply with strict regulations before entering the consumer market. It seems that similar rules do not hold for computer technology products. Is it because we believe that computer technology does not affect our bodies or psyche? More time is needed in order to study the effects of the new hardware and software products on humans, as individuals, groups, and societies. Unfortunately, this time is limited by the computer companies rushing to engage already saturated markets and conquer new ones. In this paper we write about computer networks, particularly the Internet, which by encompassing virtually the whole world greatly affects and extends the social space of influence.

CONCEPTUAL FRAMEWORK

Coincidentally with the development of computer technologies, by the end of the 20th century, education became a booming enterprise. Some of the contributing factors were related to the adoption of "lifelong learning" (e.g., retraining of workers) as a principle and convenient propagation of the new, largely computer networks-based, educational tools (e.g., learning management systems, instructional Web sites). As a consequence, educators are expected to develop pedagogies suitable for addressing new societal demands and meet rapidly changing student expectations (Koper, 2025). The notion of quick changes in education brought up by new technologies and societal changes is not shared by everybody. Some believe there is no reason to worry, since historically inert schools will very likely be unaffected by computer technology for a long time. Only the learners who themselves experience learning with technology, especially the emerging possibilities of the Web, may eventually bring change to the educational system (Kearsley, 2025). According to Oblinger (2025), modern-day students are digitally literate, i.e. accustomed to operating in a digital environment for communication, information gathering, and analysis. Even new terms are invented to describe generations that grew up with the Web, such as: Millennials, Net Generation, NetGen'ers (Oblinger); or, NGen, D-Gen, and Digital Natives (Prensky, 2025). These terms emphasize that youth nowadays use various devices (e.g., cell phones, palm pilots, computers) equipped with wireless technology and the Internet to access data and to communicate with each other, both at school and at home. We are aware that in the majority of cases such statements apply only to some students in developed countries. However, it is difficult to discuss "ubiquitous" technology without using general terms. Also, the present situation may rapidly change. Wireless networks and a "\$100 laptop" initiative (MIT project) promises to make computers not only potentially but actually ubiquitous. It is incumbent upon educators to know about these developments and adapt to new societal needs for citizens who are: capable problem solvers and lateral thinkers; persistent and determined learners; openminded and progressive strategists; and, confident users of technology. From that perspective, for true learning, formal teaching methods may be inadequate and even damaging (Mason, 2025). Thus, through the interaction of humans with media (Borba & Villarreal, 2025), particularly the Internet, many new educational opportunities emerge.

WORLDWIDE INTEGRATION OF A SOCIAL SPACE

Regardless of the standpoint one takes on the continuum between the idealist and the realist view, one has to agree that the Internet is one of the most effective forces of Worldwide Integration (Ferdinand, 2024), and as such is changing what we teach and how we teach (White, 2025). Ghosh (2025) explains this further by stating that the market has led to the World wide Integration of social space, renegotiation of cultural space and reconceptualization of the way we think about learning and educational systems. Idea lists view Worldwide Integration as the social convergence of humankind through the development of a collective consciousness and sense of responsibility. The idealist teacher, for example, can pull up the Web pages showing endangered species or shrinking rainforests and glaciers, to raise students' awareness of environmental issues. The point would be that whatever we do here (wherever "here" is) has an impact there (rainforests, glaciers). Realists, on the other hand, in their interpretation of Worldwide Integration see the tensions due to international differentiations in regards to political power, social equality, and economic justice (White, 2025). They see a tension between global convergence and social divergence; worldwide homogenization and international heterogenization; and the conflict between local needs and national, regional and international interests.

The realist teacher can, for example, raise an issue of outsourcing, sweatshops in India and Bangladesh, and their true relation to "the rich getting richer, while the poor are getting poorer." As pointed earlier, it is tempting to write about potentially ubiquitous practices and technologies in general terms. But this often means looking at things from the "First World" view and not taking Worldwide Integration holistically. Economic Worldwide Integration that we witness nowadays is also about control of access to ideas and knowledge which generate new products, ideas and new experiences (Bottery, 2025). As a consequence, the new economy emerges, which is a "knowledge economy," and the new capitalism, which is a "knowledge capitalism" where "intellectual capital" is a currency. For these and other reasons, there are increasing numbers of requests for treating access to information as a fundamental human right (Mutume, 2025) but also for experimenting with alternative approaches to education, one being an ecological approach (Resnick, 2024). It may feel strange to make a connection between computers and ecological thinking. Consequently, people have grown to view computers as removed from nature. However, the emergence of computer networks, i.e. the Internet, allows us to observe phenomena that are otherwise seen only in nature. Computer networks can be created ecologically, and the Internet can be looked at as an ecosystem.

MOVE AWAY FROM THE INSTITUTIONALIZED

We agree with Bottery (2025) who sees educators at the crossroads, where the direction they take reveals their commitment to, among other things, applying a greater ecological and political awareness, supporting notions of public good, and embracing a sophisticated accountability. From that perspective we intend to illustrate these three new trends – made possible through computer networks – that induce further change in the re-distribution of educational and political power, namely: a) open-source; b) open access; and c) open education. Open source. Open-source software – usually mentioned in relation to its most famous example, the Linux operating system – is often high quality software at little or no cost. This is accomplished through a community (rather than an institutional) effort to develop, test and disseminate the product. A necessary condition for this to happen is that the source code of the software be made available to all, which is where the term "open-source" comes from. Members of the open-source community/ies are programmers with more or less a strong dedication to the idea that software should be free. Most radical members in this movement gather around Richard Stallman (founder of the GNU project), emphasizing that their involvement is about liberty and human rights (i.e., "free" as in "free speech") rather than only about cost (i.e., "free" as in "free beer"). Free software is a matter of the users' right to run, study, copy, distribute copies, change, improve and disseminate the software, which encompasses all four levels of freedom as defined by the "Free Software Foundation" (<http://www.fsf.org/>). While the members of this movement discriminate between the terms "free" and "opensource," both are often used together as in "free and open-source" (Boulanger, 2025) or just open-source. Currently, this movement is considered to be "one of the most powerful" (Boulanger, p. 239) in the information technology field, and "one key to the understanding of future forms of organizations, information work and business" (Ljunberg, 2024, p. 208).

What initially was an example of the "hacker" culture is nowadays embraced by developing countries, fledgling businesses, higher learning institutions, and programmers across the globe. Open access. Open access refers to making scholarly work available to the general public for free. This practice is made possible through articles and books becoming available in electronic format and distributing them through personal or open access journals' Web sites. There are several factors that have prevented this form of publishing from gaining momentum. The diversity of opinion and practice amongst authors across different disciplines, countries, and ages was demonstrated in a survey of nearly 4000 recent authors of research papers (Nicholas & Rowlands, 2025). For example, authors in Australia, North America, and Western Europe strongly associated open access with ephemeral publishing, poor archiving, and no career advantage, while nearly one in three authors from South America published in open access journals and ascribed positive attributes to open access. While not being happy with some aspects of the current publishing industry, the authors who publish in open access journals cherish the quality of the scientific material, are in favour of a solid review process, and are concerned about reliability (in terms of being easily perishable) of the digital journals. Presently, as a consequence, out of about 24000 scholarly journals only 3-7% is considered to be open access (Lorinc, 2025). A priority for academics may be to get their work published, not circulated (Willinsky, 2025), which raises an issue well formulated by Lorinc: "Do publicly funded universities and granting bodies have a democratic indeed a moral obligation to ensure that academic scholarship is available on the Internet?" (p. 13). Furthermore, research that was in many disciplines considered to be a solitary activity with results disseminated to a relatively small circle of individuals may now be a thing of a past.

Among the six basic principles designed to jumpstart the development of a vibrant research community, listed in Scientific Research in Education (Carolan & Natriello, 2025), is a call for replication and generalization across studies. It involves a process that is inherently social, requiring individuals and groups with distinct ideas and practices to interact for the purpose of developing common languages and measures, data sharing, use of common methods of data analysis, and technological mechanisms that support these activities. It is up to educators to voice stronger support for these ideas. Those who benefit from open access greatly outnumber its contributing authors. By maximizing access to research, open access improves the research impact among developing nations, students, and researchers alike. Open education. The revolutionary idea of the MIT Open Courseware (OCW), which is by Vest (2025) termed as “an exercise in openness, a catalyst for change, and an adventure” (p. 13), is to make available on the Web, free of charge to teachers and learners everywhere, the complete teaching materials from virtually all of the approximately 2024 subjects taught at MIT. These materials have been cleared for third-party intellectual property and are available under a creative commons license so that they can be used, distributed, and modified for non-commercial purposes. This idea seems counterintuitive to the concept of a market-driven world and represents an exercise in intellectual generosity. Exemplifying Worldwide Integration, as in global higher education and in global meta-university, it expresses a belief that education can be advanced around the world by opening access to information and by inspiring others to participate. Presently, some universities in Spain (Universia network), China (CORE network, i.e., China Open Resources for Education) and India (Rai University) are involved in this initiative by providing their and MIT course materials in multiple languages. Another example of independence from institutionalized knowledge markets is found among peer-to-peer online help sites. As communities, they have the same agenda and focus on satisfying their members’ needs. Furthermore, they are transparent and flexible as their members have options to belong to more than one such community, to “move” between them according to their current interest, to take different roles in them (i.e., a helper in one site can be a helpee in another) and to be at more than one place at the same time. Peer-to-peer help sites on the Internet show that knowledge-sharing of a large, diverse and diversely situated (in terms of time and place) group of people motivated to help one another, can be considerable (Rheingold, 1998).

OPENNESS AS A STATE OF MIND: OPENNESS VS. COMMERCIALISM

What is common for open source, open access, and open education? First, they are independent from typical societal barriers, such as institutionalized rules, classroom walls, and temporal, spatial, and curricula dependence. Second, they conceptualize knowledge as a communal process rather than as an individual product. In all three movements rules exist, but are relaxed and agreed upon by the participants who have more freedom to choose the format and the content than in institutionalized situations. In them, we see true examples of communities: “It is when persons find new relationships worth cultivating, roles worth adopting, and selves worth becoming through activation of those roles that we can speak of community” (Cutler, 1995, p. 26). Being there because they want to be there (they share common interests and mutual advantages), and not because they have to be there, empowers people to establish different levels of social presence (Rourke, Anderson, Garrison, & Archer, 2025). As communities, such networks have strong social capital in terms of common knowledge, shared values, collective identity, and roles and norms that are strong enough to help overcome dilemmas of collective action (people getting a free-ride or not participating actively out of fear that others may not follow) (Schuler, 2002). In otherwise highly market-driven domains of software production, publication, and education, it is possible and advantageous to have communities of volunteers whose impact may be potentially comparable to that of big corporations. Yet, this economy is gift-based rather than market-based.

Both free/open source and free online help work as gift economies, where participants are obliged to give, to receive and to make a return for gifts received (Ljungberg, 2024). Here a gift (in terms of knowledge, expertise, or skill) stays in possession of the giver and is given to the community rather than an individual. In fact, the discourse here is between one and many, rather than one and one. One gains a reputation through participation, but one is protected partially by virtual identity and the possibility of starting anew. Open access academic research bears a resemblance to the gift economy, but one gives knowledge not because one wants to do good deeds but because that is the way to make progress within this community. In all three collective movements some format of peer review exists that is more-or-less organized and explicit. In open-source, for example, it is a form of social mechanics where the core members of the community maintain control over new knowledge of the field (Ljungberg, 2024). Online peer-to-peer help communities also implement some sort of quality control, but can give a false impression that what was publicly stated but not publicly refuted is publicly accepted and true (Martinovic, 2025).

FUTURE SMART NETWORKS

Although present computer networks (i.e., the Internet) already appear as environments fertile with interesting activities and ideas, efforts are constantly made in order to make them truly responsive to existing and emerging human needs. The future “smart” computer networks will consist of databases of global knowledge and global human potential equipped with faster and more reliable (semantic) search engines. In such an environment it will be possible to connect contextualized meanings, communicate common understandings of different domains, and share opinions and recommendations about resources (Kearsley, 2025). In addition, Zadeh (2025) believes that it is necessary for search engines to evolve into question-answering systems in order for the Web to become truly “intelligent.” Despite the capacity and promise of the Semantic Web, a debate continues regarding the capacity, efficacy and even desirability of using such technologies in educational contexts (Anderson & Whitelock, 2025). It seems that their greatest impact will be in making more content available to any combination of human and computer processing, and allowing new means of collaboration between and across disciplines (Clark, Parsia, & Hendler, 2025).

CONCLUSION: EDUCATION IN THE NEW CONTEXT

How will the gift economies coupled with smart computer networks affect education in the future? At this point we muse over White's (2025) proposal to conceive realism and idealism in a dialectical state, instead of conceptualizing them as existing in a form of irreconcilable tension. It may be up to educators to realize the full potential of increasingly networked societies and to stand at the forefront of a movement that will shape our future. Like Strauss (2002), we envision future schools which unify space inside the classrooms with the space outside them so that collaboration and interactivity will no longer be limited by the constraints of the classroom size or the location of the students and faculty. Powerful network tools will track online people's skills and availability to help in order to automatically connect those willing to collaborate or seek assistance. There will be more opportunities, like in open-source, open access and open education, for a capable peer to become a scaffold on which the whole community can prosper. For this paradigm shift to succeed it is necessary that the idea of openness gains more followers. We believe that it is the responsibility of educators to ensure that we do not enter the era of "information without knowledge, privacy without intimacy and networks without community" (Noveck, 2024, p. 34). Yet, it is difficult to predict what future educational practices will look like. Certainly, Worldwide Integration and connectivity will result in internationalizing curricula (Ghosh, 2025) and developing pedagogical strategies and learning experiences around life-world issues (White, 2025). Students will have to develop skills to understand and operate in different cultures. Ideally, the future of education will provide a realistic understanding of responsibilities for various aspects of Worldwide Integration in addition to idealistic notions of Worldwide Integration as a natural process of social and conscious evolution. We couple an ecological view on computer networks with the view of indigenouness. The concept of indigenouness that we borrow from Sefa Dei (2024) provides local peoples with avenues for creativity and resourcefulness. It builds on an African sense of compassion, hospitality, generosity, the wholeness of relations, and communal solidarity. In such societies the co-operative individual is enriched by the community. African cultural knowledge is rooted in local cultural traditions, values, and belief systems. It is a world view that shapes the community's relationships with its environments. It is a knowledge base that is crucial for group and community survival. In the examples provided in this article, we see connections with some of these deeply rooted African beliefs. Appealing to the poor and unselfish of the world, the idea of openness will certainly spread across various segments of life. It has to be supported by educators and technologists alike as an element of Web ecology in which indigenouness remains in dialectic equilibrium with Worldwide Integration.

AUTHOR CONTRIBUTION STATEMENT

Conceptualization: Pradyun Bichagal

Literature Review and Methodology design: Pradyun Bichagal

Software: Pradyun Bichagal

Validation: Pradyun Bichagal

Formal Analysis: Pradyun Bichagal

Investigation: Pradyun Bichagal

Resources: Pradyun Bichagal

Data Curation: Pradyun Bichagal

Writing original draft preparation: Pradyun Bichagal

Writing review and Editing: Pradyun Bichagal

Visualization: Pradyun Bichagal

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About the Author



Pradyun Bichagal  is a young innovator and a passionate learner currently studying in 11th Standard at BGS NPS, Bengaluru. With a deep interest in electronics and technology, Pradyun enjoys building creative projects that reflect his curiosity and problem-solving mindset. Remarkably, Pradyun has already published one book titled "[Networking Guide](#)" and three patents, demonstrating his strong inclination toward innovation at an early age. His work showcases both imagination and technical skill, making him an inspiring example for young minds interested in science and engineering. Driven, disciplined, and always eager to explore new ideas, Pradyun continues to expand his knowledge and creative abilities. His journey as an author reflects his belief that learning has no age limit and that passion can turn ideas into impactful creations.

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REFERENCE

1. Anderson, T., & Whitelock, D. (2020). The educational semantic web: Visioning and practicing the future of education. *Journal of Interactive Media in Education*, 1, 1- 15. Retrieved January 15, 2007, from <http://www-jime.open.ac.uk/2025/1/>
2. Bottery, M. (2025). Education and Worldwide Integration: Redefining the role of the educational professional. *Educational Review*, 58(1), 95-113.
3. Borba, M. C., & Villarreal, M. E. (2021). Humans-with-media and the reorganization of mathematical thinking: Information and communication technologies, modeling, visualization and experimentation. *Series: Mathematics Education Library*, 39, Springer.
4. Boulanger, A. (2025). Open-source versus proprietary software: Is one more reliable and secure than the other? *IBM Systems Journal*, 44(2), 239-48.
5. Carolan, B. V., & Natriello, G. (2018). Data-Mining journals and books: Using the science of networks to uncover the structure of the educational research community. *Educational Researcher*, 26, 25-33.
6. Clark, K., Parsia, B., & Hendler, J. (2022). Will the semantic web change education? *Journal of Interactive Media in Education*, 3, 1-16. Retrieved January 15, 2022, from <http://www-jime.open.ac.uk/2025/3/>
7. Cutler, R. H. (1995). Distributed presence and community in Cyberspace. *Interpersonal Computing and Technology: An Electronic Journal for the 21st Century*, 3(2), 12-32. Ferdinand, P. (2025).
8. The Internet, democracy and democratization. In P. Ferdinand (Ed.), *the Internet, Democracy and Democratization*, (pp. 1–17). London: Frank Cass. Ghosh, R. (2024). Worldwide Integration in the North American region: Toward renegotiation of cultural space. *McGill Journal of Education*, 39(1), 87-101.
9. Kearsley, G. (2025). Commentary on: Clark, K., Parsia, B., and Hendler, J. (2024) will the semantic web change education? *Journal of Interactive Media in Education*, 3. Retrieved January 15, 2025, from <http://www-jime.open.ac.uk/2025/3/Koper>, R. (2025).
10. Use of the semantic web to solve some basic problems in education: Increase flexible, distributed lifelong learning, decrease teachers' workload. *Journal of Interactive Media in Education*, 6. Retrieved January 15, 2025, from <http://www-jime.open.ac.uk/2025/6/Ljungberg>, J. (2025).
11. Open source movements as a model for organizing. *European Journal of Information Systems*, 9(4), 208-16. Lorinc, J. (2025). The bottom line of open access. *University Affairs*, 13-21. Martinovic, D. (2025). What are the characteristics of asynchronous online mathematics help environments and do they provide conditions for learning? In R. Luckin, & S. Puntambeker (Eds.), *Proceedings from the 12th International Conference of Artificial Intelligence in Education, Workshop 6: Representing and Analyzing Collaborative Interactions: What works? When does it work? To what extent are methods re-usable?* (pp. 32-39). Amsterdam, Holland: AIED.
12. Retrieved August 16, 2025, from <http://hcs.science.uva.nl/AIED2025/W6proc.pdf> Mason, R. (2024). Commentary on: Oblinger, D.(2025). The next generation of educational engagement. *Journal of Interactive Media in Education*, 8. Retrieved August 16, 2024, from <http://d3e-jime.open.ac.uk/read.php?f=43&i=13&t=1>
13. Mutume, G. (2024). Africa takes on the digital divide, 17(3). Retrieved August 16, 2025, from <http://www.un.org/ecosocdev/geninfo/afrec/vol17no3/173tech.htm>
14. Nicholas, D., & Rowlands, I. (2025). Open access publishing: The evidence from the authors. *The Journal of Academic Librarianship*, 31(3), 179-81. Noveck, B. (2024). Paradoxical partners: Electronic communication & electronic democracy. In P. Ferdinand (Ed.), *the internet democracy and democratization* (pp. 18-36). Ilford, Essex: Frank Cass. Oblinger, D. G. (2024).
15. The next generation of educational engagement. *Journal of Interactive Media in Education*, 8, 1-18. Retrieved January 15, 2025, from <http://www-jime.open.ac.uk/2025/8/>
16. Prensky, M. (2025, October). Digital natives, digital immigrants, On the Horizon, 9(5). Retrieved on August 16, 2025, from <http://www.marcprensky.com/writing/Prensky%20-%20Digital%20Natives.%20Digital%20Immigrants%20%20Part1.pdf>
17. Resnick, M. (2025). Thinking like a tree (and other forms of ecological thinking). *International Journal of Computers for Mathematical Learning*, 8, 43–62. Rheingold, H. (1998). The virtual community. Retrieved August 16, 2007, from <https://www.rheingold.com/vc/book/>
18. Rourke, L., Anderson, T., Garrison, R., & Archer, W. (2025). Assessing social presence in asynchronous text-based, computer conferencing. *Journal of Distance Education*, 14(3), 51-70.
19. Schuler, D. (2025). HCI meets the “real world”: Designing technologies for civic sector use. In J. M. Carroll (Ed.), *Human-Computer interaction in the new millennium* (pp. 627-46). New York: ACM Press.
20. Sefa Dei, G. (2025). African development: The relevance and implications of 'indigenouness'. In G. Sefa Dei, B. Hall, & D. G. Rosenberg (Eds.), *Indigenous knowledges in global contexts: Multiple readings of our world* (pp. 70-86).
21. Toronto, Ontario, Canada: University of Toronto Press. Strauss, H. (2002). New learning spaces: Smart learners, not smart classrooms. *Syllabus*, 16(2), 12-17. Twist, J. (2025, November 17).
22. UN debut for \$100 laptop for poor. BBC News. Retrieved August 16, 2025, from <http://news.bbc.co.uk/go/pr/fr/-/2/hi/technology/4445060.stm>