

From STEM to STEAM

A Modest Proposal

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TODAY, THE DWINDLING ENROLLMENT of literature majors in colleges and schools and the diminishing interest in reading literary works in society are a widely recognized fact, if not around the globe, at least in the U.S. In most universities and colleges, literary studies across the country are struggling to survive in the age of digital revolution by eking out their existence on the fulfillment of literary requirements for general education. And most people in society today are likely to read almost anything on iPhone, iPad, and internet *but* literary works, be it poetry, fiction, or drama. There are tell-tale signs and statistical evidence to confirm that literature as a topic for readings is dying out in ordinary people's life, and literary studies are becoming increasingly marginalized by the growing dominance of STEM (science, technology, engineering, and mathematics) subjects in schools and colleges. In an increasing number of schools and colleges across the globe, students take courses in literature not because they enjoy reading literary works, but because they are required to take a certain number of literature courses before they can graduate and obtain their educational degrees.

This situation is confirmed by my own experience.¹

The bleak situation is not restricted to the West. In fact, in most universities and colleges across the world, literary studies are struggling to survive in the age of globalization and telecommunications. As a result, not a few thinkers have expressed an alarmist view that in the foreseeable future, literary studies are likely to become an endangered species among the institutionalized academic disciplines. Jacques Derrida, for one, predicted as early as the 1980s: "An entire epoch of so-called literature, if not all of it, cannot survive a certain technological regime of telecommunications (in this respect the political regime is secondary). Neither can philosophy, or psychoanalysis. Or love letters."²

¹This is confirmed by own personal experiences. Every year, I teach at least one general humanities course with a focus on literature. Each class varies from 70 to 90 in the number of students. At the beginning of each course, I always take a straw survey. My finding is that humanities majors constitute a very small percentage while the number of literary majors counts by fewer than one hand.

²Jacques Derrida, *The Post Card: From Socrates to Freud and Beyond*, tr. Alan Bass (Chicago: University of Chicago Press, 1987), p. 24.

The sharp declining of humanities majors is duly reflected in a recent report by the commission of the American Academy of Arts and Sciences.³

In view of the stark reality facing literature and literary studies, this article will revisit C. P. Snow's notion of "Two Cultures" in relation to the existing opinions on the status of literature, briefly review the impact of STEM on literary studies in higher education, and examine the feasibility of reviving popular interest in literature through a new conception. As a feasible move to prepare us for the coming of the so-called "post-literary" age, I propose a dual conception of "big literature" as greater humanities and "small literature" as *belles lettres* or refined literature in the traditional sense. With this proposal, I conduct a comparative study of some techno-texts and traditional types of literature and reflect on opportunities afforded by the digital revolution to turn STEM into STEAM (science, technology, engineering, arts and mathematics) in the postmodern, post-human, and post-technology era.

The STEM Boom and the Return of the "Two Cultures"

In an article titled "The Shrinking Humanities Major" published in *Inside Higher Education*, a study using data analysis from the Humanities Indicator project by the American Academy of Arts and Sciences finds that "The number of bachelor's degrees conferred in what the academy considers core humanities disciplines (English language and literature, history, languages and literatures other than English, linguistics, classical studies,

and philosophy) declined 8.7 percent from 2012 to 2014, falling to the smallest number of degrees conferred since 2003."⁴ It also notes that the decline is a consistent trend. By contrast, majors in STEM subjects have seen a steady rise since 1990. On the following page is a chart showing the trend of shifts in bachelor's degrees awarded by discipline since the later 1980s (Figure 1).

Although literature is not listed as a separate category, it is the major component in the statistics. There is little doubt that natural sciences majors are on the steady rise. Despite ups and downs, the subject of engineering has kept its number of majors more or less since 1990. Thus, it is reasonable to say that though the prophesied demise of literature as an educational institution may have many factors, the declining enrollment of literary majors in colleges is statistically attributable to the hegemony of STEM subjects in institutions of higher learning. The sharply declining trend of humanities majors keeps pace with that of federal funding for the humanities in the report by the commission of the American Academy of Arts and Sciences.

A look at the chart (Figure 2) confirms three facts already known from casual observations: (1) the funding for the humanities is the smallest, and it is much smaller than that of the natural sciences; (2) it is declining year by year and now is at the lowest ebb; (3) humanities keep losing out in the competition for funding with sciences and technology subjects.

In view of the competition between humanities and STEM subjects, we seem to have come full circle and returned to an old dilemma, which appeared in the first half of the twentieth century and has never been satisfactorily resolved. This is the problem of "The Two Cultures," first identified by C. P. Snow in his famous lecture delivered in

³ *The Heart of the Matter: The Humanities and Social Sciences for a vibrant, competitive, and secure nation*, Cambridge, MA: the Commission of the American Academy of Arts and Sciences, 2013. available online at <http://www.amacad.org>

⁴ Scott Jaschik, "The Shrinking Humanities Major," *Inside Higher Ed*, March 14, 2016.

Distribution of Bachelor's Degree Completions among Academic Fields (1987-2018)

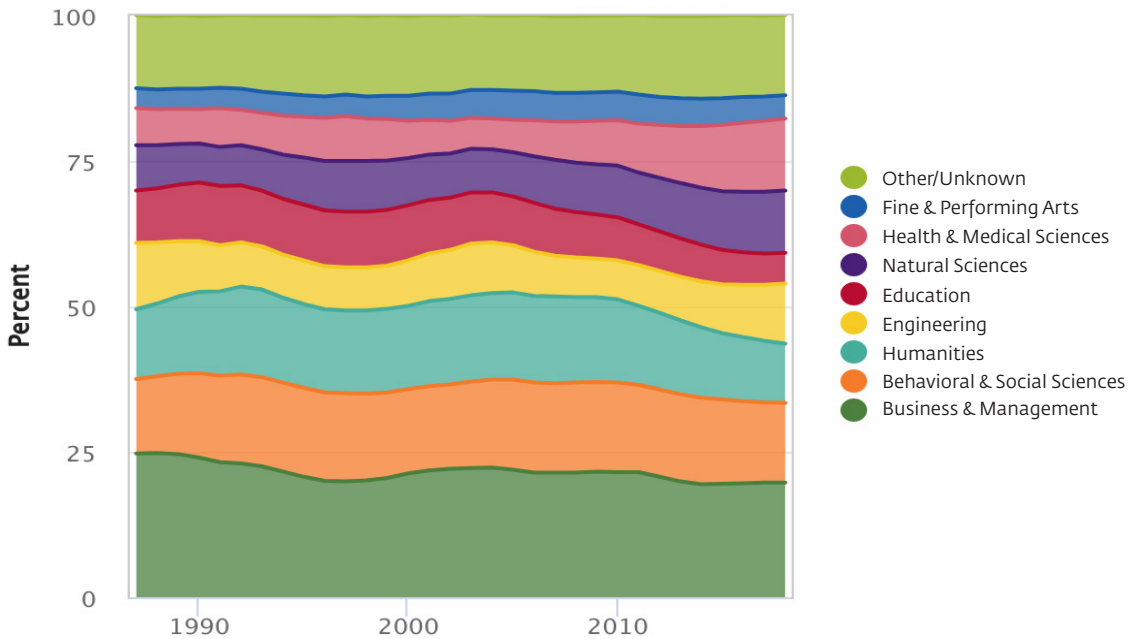


Figure 1 Humanities Indicators, 2021, American Academy of Sciences, amacad.org/humanities-indicators/higher-education/bachelors-degrees-humanities#31602

1959, subsequently published in its book form as *The Two Cultures and the Scientific Revolution*. In this influential book, Snow articulated his famous argument that the intellectual life of the whole Western society has split into two contrasting and almost exclusive cultures—one of the sciences and the other of the humanities; and the split became an obstacle to resolving world problems in the modern age.⁵ For quite some time, Snow's argument attracted a great deal of attention and aroused a considerable amount of concern among far-sighted thinkers and intellectuals, but after much sound and fury, the furor died out and the warning in his argument has, until recently, almost been forgotten, at least in the mind of the general public. With the coming of the age of telecommunication, however, the old dilemma identified by Snow has returned to haunt us again and this time, with a

⁵ C. P. Snow, [1959] *The Two Cultures* (London: Cambridge University Press, 2001), p. 3.

vengeance. It has not only affected the developed nations of the West but also exerted a negative impact on the developing countries of the third world.

In efforts to salvage literary studies from the pressures of STEM and to avert the likely coming of the apocalyptic future, theorists and scholars in literary studies have scrambled to propose strategies and measures to sustain literary studies. It seems to me that the strategies and measures advocated and proposed may be classified into two large categories, which happen to fall into two opposite poles. One is progressively looking forward and introduces new theories and approaches to literary studies, which range from the already well-known schools of feminism, women's studies, gender studies, post-colonial studies, post-structuralism, New Historicism, to more recent theories like gay and lesbian studies, queer theory, eco-criticism, literary Darwinism, post-humanism, cognitive studies, diasporic

Federally Funded Share of Expenditures for Academic Research and Development in the Humanities and Other Selected Fields (Fiscal Years 2007-2019)

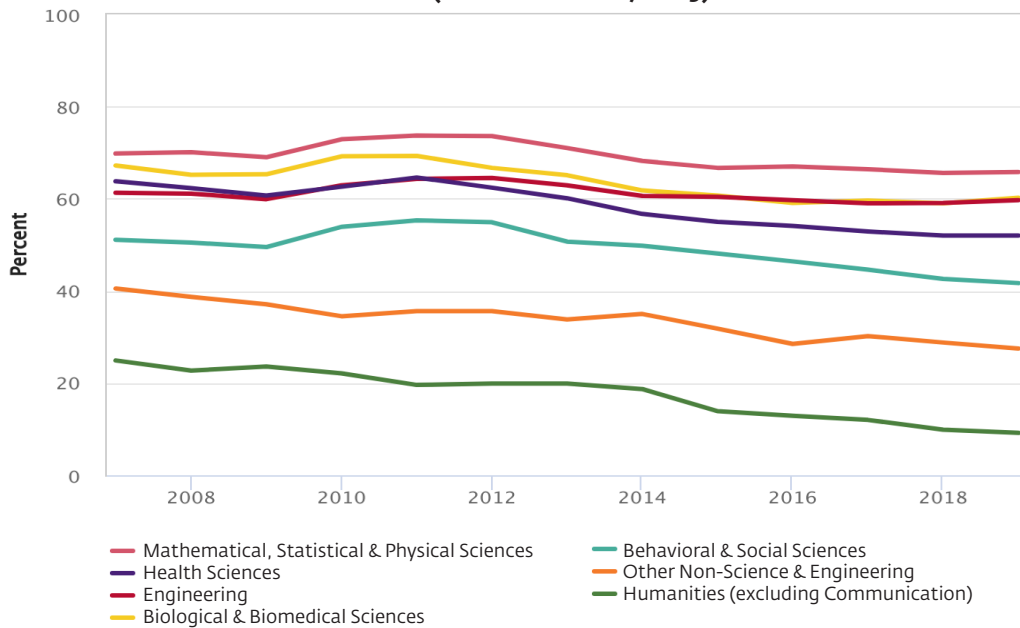


Figure 2 Humanities Indicators, 2021, American Academy of Sciences, amacad.org/humanities-indicators/figure/iv-35c-federally-funded-share-expenditures-academic-research-and

studies, cultural studies, etc. Ironically, while these new theories and approaches have broadened our horizons in literary studies and aroused immense interest among literary scholars, they have produced a strong alienating effect on students as well as given rise to a tacit or open reaction from some scholars of literature. Some scholars of literature have openly criticized the “new-fangled” theories of literature, attributing the decline of literary studies to the introduction of radically new theories and approaches, and calling for a return to traditional approaches to literature. In the 1980s when theory was the rage, it was attacked by some conservative critics.⁶ As a consequence, Paul de Man had to come up with a defense of theory. In his influential essay, “The Resistance to Theory,” he acknowledged the devastating effect and consequence caused by the controversy over theory: “The most

effective of these attacks will denounce theory as an obstacle to scholarship and, consequently to teaching.”⁷ The conservative attack on post-structuralist and postmodern theories may be somewhat outlandish, but to be fair, it is partially justified at least by the alienating effects of postmodern theories on students. A few of my colleagues complained that most poststructuralist and postmodern theories of literature, instead of fostering students’ interest in literary studies, have estranged them from literature and literary studies and taken much of the fun of reading literature away from students. For these reasons, Edward Said, while lamenting the disappearance of literature itself from college curriculum, vehemently denounced the “fragmented, jargonized subjects” that have taken its place.⁸

⁷ Paul de Man, “Resistance to Theory,” *Yale French Studies* 63 (1982), 4.

⁸ Said, “Restoring Intellectual Coherence,” in *MLA Newsletter*, Vol. 31, No. 1 (Spring 1999), p. 3.

⁶ Peter Shaw, “The Dark Age of the Humanities,” *The Intercollegiate Review*, 23.1 (Fall, 1987), 5-9.

From another direction, some literary scholars and teachers have devised various practical strategies and measures to deal with the declining interest in literature and literary studies as a result of the dominance of telecommunication and high-tech prestidigitation.⁹ Their measures may achieve a certain degree of success, but these are nothing more than contingent measures to improve student enrollment, ineffective to shore up the status of literature and will prove to be vain attempts to curb the declining trend of dwindling interest in literature. Although a recent survey shows some optimistic results in young people's engagement with reading literature after a two-decade decline, a 2004 report by the National Endowment for the Arts states a sad fact adequately conveyed by the title: "*Reading at Risk: A Survey of Literary Reading in America.*"¹⁰ To resuscitate literary studies and salvage the literary institution from the claws of the revolution in information technology, we must revisit the problem of "Two Cultures" and rethink the nature, function, and approaches to literature, and explore ways to meet the challenges of STEM and the dominance of telecommunications. We must admit that the time has changed, and so literature has to change with it. As one think piece about the fate of literature in the age of information well puts it, "To thrive in the fluid, multifarious information habitat of today, the literary animal must become a *chameleon*."¹¹ The current conception of literature belongs to the social and technological milieu of print

9 See Ranjan Ghosh and J. Hillis Miller, *Thinking Literature across Continents* (Durham, NC: Duke University Press, 2016).

10 "*Reading at Risk: A Survey of Literary Reading in America*," Research Division Report no.46, National Endowment for the Arts, Washington, DC, 2004.

11 "The Future of Literature in the Age of Information," from *Three Pound Brain*, rsbakker.wordpress.com/essay-archive/the-future-of-literature-in-the-age-of-information/

culture, very different from the present-day era of media and communications. The gigantic transformation of human communications in our time demands a new conception capable of preparing us for the coming of the so-called "post-literary" era.

A Dual Conception of Literature

When thinkers issued warnings about the "death of literature," they were talking about the death of "literature" in the traditional sense. Contrary to the prophesied demise, the ongoing technological revolution has brought about a revolution in literary creation. As a result, far from being threatened with extinction, literature is thriving in the age of telecommunications, albeit in multi-platformed forms other than those in the traditional sense. This revolution in literary creation should give us insights for addressing the problem of "The Two Cultures" and to meet the challenges posed by STEM. In view of the fact that films, television, music videos, cartoons, advertisements, and the performing arts are already being taught side by side with literary works in some literature departments around the world, it behooves us not to pit STEM against literature, but to reconceive them in an interpenetrating, cooperative, complementary, and mutually empowering relationship.

Such a conception of literature's relationship to STEM should give us ideas to meet the challenges posed by STEM. Unlike the cited thinkers and scholars who have discussed the "death of literature," I am not going to examine who or what is responsible for the declining conditions of literature in its traditional sense. In view of the fact that films, television, music videos, cartoons, advertisements, performing arts are already being taught side by side with

literary works in some literature departments around the world, I deem it strategically important to propose a new conception of literature to cope with the challenges to literature. This conception has its core in a distinctive categorization of two kinds of literature: (1) “literature in its narrow sense”; and (2) “literature in the broad sense.” For the sake of convenience, the two categories may be replaced by two short terms: “Small Literature” and “Big Literature.” “Small Literature” is “small” because it refers to the tacitly accepted but narrow and restricted conception of literature as *belles lettres* or refined writing in the time-honored category of poetry, fiction, drama, and refined essays, taught and studied in colleges and schools for centuries. “Big Literature” is “big” because it refers to a wide range of writings in general, not confined to the accepted literary genres, but including any imaginative writing like film, TV series, pop songs, online fiction, comic writings, webpage writings, blog writings, etc., not to mention such hybrid, multi-platformed writings as kinetic poetry, hypertext fiction, chromomosaic novels, and collaborative narratives—all are made possible by or related to the digital revolution. In other words, “Big Literature” in the broad sense is a term for general, imaginative writings to be subsumed under the large category of “greater humanities.”

The dual conception has its conceptual grounds and a workable logic. Conceptually, literature is a slippery category, which has repeatedly escaped our attempts to nail it down with hard and fast definitions. As Terry Eagleton humorously puts it, “literature does not exist in the sense that insects do, and [that] the value judgements by which it is constituted are historically variable.”¹² Historically, many

12 Terry Eagleton, *Literary Theory: An Introduction* (Oxford: Blackwell, 1983), p. 16.

genres of writings, which were not regarded as literary works in our common sense, past and present, have nevertheless been treated as belonging to literature. In fact, in its evolution in history, the conception of literature was closely connected to technology and once included treatises by scientists. First and foremost, “literature” was closely involved with the development of technology, especially printing: “Literature itself must be seen as a late medieval and Renaissance isolation of the skills of reading and of the qualities of the book; this was much emphasized by the development of printing.”¹³ Moreover, “literature” in ancient times not only included writings of philosophers but also treatises by scientists. In around 1825, the English writer William Hazlitt is reported to quote another person as saying, “I suppose the first two persons you would choose to see should be the two greatest names in English literature, Sir Isaac Newton and Mr Locke.”¹⁴ We know very well that while the former is a scientist, the latter is a philosopher. Neither of them is regarded as a literary writer in our present-day society. After the industrial revolution, there has been a broadening tendency in the developing notion of “literature” in modern times into areas of media and communications. This trend, Raymond Williams observes, is a reaction against the narrow way of restricting “literature” to the “printed book or to past literature rather than to active contemporary writing and speech” and “touch[es] the whole difficult complex of the relations between literature (poetry, fiction, imaginative writing) and *real* or actual experience.”¹⁵ The appearance of science fiction as a new

13 Raymond Williams, *Keywords: A Vocabulary of Culture and Society*, revised edition (从小文学New York: Oxford University Press, 1983), p. 186.

14 *Ibid.*, 185.

15 *Ibid.*, p. 187.

A video game shares with the novel and epic the qualities of fictionality and extended narrative.

genre in the nineteenth century and its recent upsurge in popularity are eloquent testimonies to the broadening trend of literature in the age of digital revolution and telecommunications, and should give us much food for thought in our efforts to turn technology from an “enemy” of literature to an “ally” in sustaining popular interest in literature in society and reviving literary studies in colleges and schools.

STEM as an Ally for Literature

The opening of this article addresses the concern with the shrinking of literary majors and the dwindling of reading public of literature. One may ask: why should we bother with the shrinking of literary majors? Will a person who does not read literature perish? The first question is eloquently answered by my colleague, Professor Dennis Kratz, former Dean of Arts and Humanities at UT Dallas: “A university without arts and humanities is only half a university.”¹⁶ The second question has been repeatedly answered by numerous thinkers and scholars in history and the present, whose elaborate ruminations may be boiled down to one often heard truism: “Literature matters.”¹⁷ But how can literature as an institution and as an aspect of civilized life survive the onslaught of STEM and digital revolution? The answer seems to be found in feasible ways to turn STEM into STEAM.

With the exponential acceleration of technological development, STEM subjects

16 Cited from a letter by the dean of the School of Arts and Humanities addressed to the President of the University of Texas at Dallas in 2017.

17 J. Hillis Miller, “Literature Matters Today.” *Substance* 42. 2 (2013): 12-32.

will continue to dominate education and society and turn more and more people into netizens of interface culture.¹⁸ This irresistible trend has its inevitable drawbacks and social consequences, which have been observed by many. Even in technical aspects, interface culture has shortcomings identified by enthusiastic supporters and theorizers of digital revolution. In his acclaimed book *Interface Culture*, Steven Johnson, while finding interface design exciting and fascinating, faults it for placing excessive emphasis on graphic elements in interface culture at the expense of textual aspects of our culture.¹⁹ This is indeed the case. Take the study of video games for example. Up to now, there are two schools of game theories: ludology and narratology.²⁰ Narratologists recognize the role of video games as a storytelling medium, and emphasize its narrative function as cyberdrama or interactive fiction, which presents a simulated story world where a player engages in responding to what happens to him or her, like a character in a literary work. Ludologists, however, argue that the narrative function is secondary, if not incidental, to video games, although a video game has narrative elements like story, plots, characters, and action in a traditional story. Nevertheless, they strongly argue that a video game is first and foremost a game, and should abide by

18 A netizen is “a user of the Internet, especially a habitual or avid one.”

19 Steven A. Johnson, *Interface Culture: How New Technology Transforms the Way We Create & Communicate* (New York: Basic Books, 1999).

20 Gonzalo Frasca, “Ludology meets narratology: similitude and differences between (video)games and narrative.” (1999). *Ludology.org: video game theory*. www.ludology.org. Retrieved May 2, 2018.

the ludic principle of entertainment. As the present-day situation shows, the ludologist theory seems to be more popular. If this is the case, the ludologist trend is certainly detrimental to the integration of computer games and literary works and channels what may be called “gamification of literature” in a direction more and more remote from literary works. Narratologist or Ludologist, the prevailing principle of computer game designing is profit-driven and overlooks the social responsibility of moral education.

Some Suggestions to Turn STEM into STEAM

Although we may lament the fact that the socially critical role once played by novelists like Dickens, Hardy, Zola, Lawrence, and Dreiser, who exposed the grave consequences of rapid industrialization, has been taken over by technology-generated media, we should not lose sight of another fact that science and technology are not natural enemies of literature and can be utilized to transform literature and arts into interface humanities. This new kind of humanities may bridge the gap between technology and arts by providing new and innovative platforms for the functions of education, cognition, and entertainment that used to be fulfilled by literature and arts. To create a viable humanities, we should have the broadest possible conception and definition of literature in the age of globalization and telecommunications. Some literature departments have already incorporated painting, photography, film, and TV into their literary curricula. And some universities have already merged arts and technology into one school. The recent merging of arts, humanities, and technology into a new school at the University of Texas at Dallas represents this new developmental trend. Going with this trend, we may

expand the literary curricula to include online literature, blog writings, visual artifacts, and even video games.

A broad literary curriculum does not mean that we should completely abandon the established sense of the literary. It only means that what has been taken as literature will make adjustments to allow for mutations and transformation of the literary in the face of radical technological changes and challenges. Whatever is included should be subjected to aesthetic reconfigurations determined by what has been tacitly taken as the literary, and conform to the time-honored functions of literature.

As a way to turn technology into an ally to literature, we should find as many interconnections between literature and technology as possible. One obvious connection is to marry literature with video games. To argue for the inclusion of video games into literature may seem extremely quixotic, but for literature to survive under the onslaught of technology, this move may be a viable way to revive popular interest in literature and reinvent the teaching machine under the pressures of STEM. James Paul Gee’s book on the positive effects of video games on learning should make us rethink the role of video games and other digital games for reviving general interest in literature.²¹ A video game shares with the novel and epic the qualities of fictionality and extended narrative. Like lyric poetry, it possesses a subtlety of emotions, themes and symbols. Comparable with film and TV series, it features the elements of storytelling, movable images, dazzling music cues and visual sights. In a word, video games possess the strengths of most artistic media without many of their limitations. For these reasons, some people

²¹ James Paul Gee, *What Video Games Have to Teach Us about Learning and Literacy* (New York: Palgrave Macmillan, 2007).

believe that video games are endowed with the potential to become the best suited form of storytelling for our time. In my opinion, however, for video games to become a post-literary text, they need to integrate canonical literary works into the process of their design. Up to the present, video games have already made excursions into classical literary works. For example, game designers have made use of Shakespeare's *Hamlet* in the creation of a game: *Hamlet or the Last Game without MMORPG Features*. It is an adventure game based on Shakespeare's titular drama developed by the independent video game developer Denis Galanin. Of course, although the game deviates radically from Shakespeare's original drama in a plot in which Hamlet returns to find Claudius and Polonius locking up Ophelia with the aim to marry her to the usurping king, it surely would attract the attention of readers who have never read the play, thus stimulating their interest in reading the classic. Although the game has been positively reviewed by media and game critics, regretfully, it focuses too much on fantastic imagination and entertaining function of games to the complete neglect of the original plot and aesthetic qualities of the original classic. This seems to be very typical of the outcome of combining games and literary works: the gamification of literature. In my view, with due respect to traditional literary narratives and the function of aesthetics and moral education, video games may yet give rise to a new literary genre that can rival traditional literary works. The modern conception of literature incorporated some literary genres like the novel and science fiction into the Pantheon of literature rather late, but they were finally admitted. The same may happen to technology generated genres of writing and works of art. Perhaps it may not be

entirely groundless to predict that technology-generated writings may someday gain their entry into the curriculum of literature, if we are open-minded enough to view literature in its broad sense.

Today, among the reading public, science fiction has enjoyed an unprecedented popularity. Science fiction has the benefits of both worlds—those of the sciences and humanities, and its popularity among the reading public is the consequence of both technological advancement and the innate drives of the human desire to control one's world and destiny in the postmodern and posthuman age of media and telecommunications. I believe that science fiction may play a crucial role in turning STEM into STEAM in colleges and schools and nurturing students into professionals with a refined sense of humanities. When STEAM truly becomes predominant in the curricula of colleges and schools, we may achieve genuine success in re-inventing the teaching machine for our time and in bridging the gap between the culture of sciences and that of the humanities in both schools and society. In the postmodern, post-human, post-literary, post-technology age, the digital revolution calls for interface humanities so as to meet the demand of nurturing a new type of educated people: a hybrid person who is a humanist-scientist or scientist-humanist depending on his or her career focus. There have been numerous such hybrid persons in human history, ranging from Aristotle, Leonardo, Spinoza, Leibniz, and Kant to C.P. Snow, Marshall McLuhan, Katherine Hayles, Steven Johnson, and others. "Big Literature" as an example of interface humanities should foster the appearance of large numbers of such humanist-scientists and scientist-humanists in the age of telecommunications and post-humanism. A