

# FU Zan's Gaming Odyssey: Decoding China's Computer Literacy through Joysticks

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**Abstract:** This paper investigates the pivotal contributions of FU Zan to the popularization of computer literacy in China, with a particular focus on his innovative use of game consoles as educational tools. At a time when personal computers were prohibitively expensive and largely inaccessible to the majority of Chinese families, FU recognized the potential of affordable game consoles to serve as an entry point to computer literacy. His advocacy for integrating keyboards with gaming systems played a significant role in popularizing multifunctional devices that blended both educational and entertainment functions. The paper examines how FU's vision aligned with broader societal and educational objectives in China, especially during the period of the Four Modernizations. It further explores how grassroots innovations, notably the development of commercial "educational computers", helped bridge the digital divide, providing access to computing technology for ordinary families. Additionally, the paper contrasts this market-driven approach with top-down governmental initiatives, such as electrified education, which aimed to integrate technology into classrooms across the country. Through the lens of FU Zan's work, this study underscores the intersection of grassroots innovation, government initiatives, and the unique socio-economic context of China's digital education landscape. FU Zan's efforts, alongside those of other key figures, laid the groundwork for the widespread adoption of computer literacy in China, highlighting the critical role of accessible and affordable educational technologies in shaping the future of both technological and educational development.

## 1. Introduction

The integration of technology into education has always been a pivotal step toward modernization, as evidenced by numerous global initiatives throughout the late 20th century. In China, the convergence of reform policies, grassroots ingenuity, and educational aspirations created a unique trajectory in computing education. Central to this narrative is FU Zan, a visionary educator who reimagined the role of game consoles in teaching computing skills, turning them into an accessible gateway to Computer literacy for millions of Chinese students.

FU's story unfolds against the backdrop of China's Four Modernizations, a national strategy initiated in 1978 to rejuvenate agriculture, industry, national defense, and science and technology. Among these priorities, technological modernization symbolized the nation's aspirations for a competitive and prosperous future[1]. However, widespread economic challenges and limited access to advanced computing technologies posed significant obstacles to realizing these goals. FU Zan's innovative use of video games as educational tools addressed this gap, bridging resource constraints and fostering technological curiosity in an era of transformation.

This paper explores Fu Zan's contributions to the intersection of gaming and education, examining his work through the lens of cultural adaptation, technological innovation, and social impact. By contextualizing his efforts within global computing trends and China's unique socio-economic environment, the study highlights how Fu's initiatives catalyzed a new understanding of computer literacy, one rooted in practicality and inclusivity.

## **2. Historical Context: Global and Local Perspectives**

### **2.1. The Global Push for Computer Literacy**

During the late 20th century, the rapid growth of computing technologies sparked widespread interest in integrating computers into education. Governments across the globe initiated ambitious programs to cultivate digital literacy, recognizing the economic and social benefits of a tech-savvy workforce.

In the United States, the growing prevalence of personal computers like the Apple II inspired educational campaigns such as Apple's "Kids Can't Wait"[2]. This initiative, bolstered by California's 1982 Computer Equipment Contribution Act, enabled companies to receive tax incentives for donating computers to schools[3,4]. As part of this effort, Apple distributed nearly 10,000 Apple IIe computers, introducing a generation of students to the basics of programming and personal computing[5].

France, in a parallel effort, launched its *Plan Informatique pour Tous* (Computing for All) in 1985. With a dual focus on education and industrial development, the French government aimed to install over 100,000 computers in 50,000 schools and train 110,000 teachers within a year[6]. The program represented a significant investment in digital literacy and the national economy, underscoring the country's commitment to fostering technological independence.

Meanwhile, the UK's BBC Computer Literacy Project emerged as a landmark initiative in response to *The Mighty Micro*, an ITV documentary predicting the transformative impact of microcomputers. The project combined educational television programming with the distribution of the BBC Micro, a robust computer designed by Acorn Computers. With 32 KB of RAM, multiple video outputs, and expansion capabilities, the BBC Micro was both a practical teaching tool and a professional-grade device. Accompanied by programs like *The Computer Programme*[7] and *Making the Most of the Micro*[8], this initiative emphasized practical computing skills and system control.

These global efforts underscored the transformative potential of computers in education but also highlighted significant barriers, including high costs, uneven access, and varying levels of public awareness. In China, these challenges were compounded by decades of technological isolation and economic constraints, requiring a localized and innovative approach to computing education.

### **2.2. The Technological and Economic Context in China**

China's journey into the digital age was shaped profoundly by its socio-economic conditions and political aspirations during the late 20th century. The push for modernization under DENG Xiaoping's leadership provided the foundation for initiatives in science and technology education. A pivotal moment occurred on February 16, 1984, when DENG visited the Ten-Year Scientific Achievements Exhibition in Shanghai. During the visit, he famously remarked, "The popularization of computers (knowledge) should start with children". This statement not only symbolized the government's commitment to educational computing but also catalyzed the development of an entire market for educational electronics in China.

In response to the growing demand for accessible computing, China developed its first domestically-produced home computer, the China Educational Computer (CEC), commonly referred to as the "Zhonghua Learning Machine". Officially launched in 1986, the CEC was inspired by the technical standards of the Apple IIe and the aesthetic design of Japan's MSX2. It featured a 1 MHz 6502 microprocessor, 64KB of memory, and compatibility with Apple II software. The system was designed to connect to home televisions, making it both affordable and accessible to a wider audience. The introduction of the CEC marked a pivotal moment in China's efforts to bridge the gap between cutting-edge computing technology and the average household, reflecting a localized adaptation of global educational computing trends.

The term "learning machine" itself, which became synonymous with affordable home computers in China, originated from the English term "learning kit." Initially, it referred to microprocessor development boards used for training technical personnel. In Taiwan, similar devices included the All Asia EDU-80 and Acer's Professor One, a microprocessor learning tool.

Acer's subsequent release, the Professor Two, was an Apple II-compatible computer, signaling a shift in learning machines from technical training tools to consumer-friendly home computers.

Interestingly, the label "learning machine" also gained traction due to its economic implications. Educational products often enjoyed favorable policies, including tax breaks and subsidies, which incentivized manufacturers to market their devices as tools for education rather than general-purpose computers. This strategic branding not only highlighted the practical and educational utility of such machines but also aligned with broader governmental goals to promote computer literacy and technical education.

The development of the educational computers exemplified how China adapted global technological innovations to its local needs. These devices provided an affordable entry point to computing for millions of families, laying the groundwork for a generation of digitally literate citizens while responding to the nation's call for modernization.

### 3. FU Zan's Vision and Innovations

#### 3.1. From Entertainment to Education

FU Zan's contributions to Chinese computer literacy and education stand out for their resourcefulness and creativity in an era of technological scarcity. While global technological trends in computing and education were dominated by institutional or corporate initiatives, FU's work was grounded in grassroots innovation. His vision redefined the potential of gaming systems, not only as entertainment devices but also as platforms for education and technological empowerment.

At a time when access to personal computers was limited and prohibitively expensive, FU Zan pioneered a novel approach to integrating gaming consoles into educational contexts. Instead of viewing video games as merely a form of leisure, FU recognized their potential to spark curiosity and foster engagement with technology. His approach was straightforward: use gaming as a medium to teach essential computing skills.

In his classes at Fuzhou No. 16 Middle School, FU utilized game development as an entry point for programming education. One of the most notable examples was his introduction of a simple game, **Electronic Paddle Ball**, inspired by the classic arcade game *Pong*. This interactive game, consisting of fewer than 30 lines of BASIC code, allowed students to create a working program that combined logic, input-output systems, and graphical elements. By engaging students with tangible and immediate results, FU demystified the complexity of computers, instilling confidence and curiosity in his pupils. For many students, this hands-on approach transformed what might have been an intimidating technology into an accessible and engaging tool.

FU's teaching philosophy revolved around the belief that interest is the best teacher. He observed that games could serve as a bridge between abstract concepts and practical skills. This belief was grounded in a broader observation about the gaming industry: he noted that in Japan, gaming had grown to rival the automotive industry in economic scale. This realization solidified his conviction that games, if harnessed correctly, could become powerful educational tools. He envisioned a future where students, captivated by the interactivity of games, could seamlessly transition into understanding computational thinking and digital problem-solving.

#### 3.2. Television Games: A Quick Guide

FU's innovative ideas were further encapsulated in his landmark publication, *Television Games: A Quick Guide*, published in 1990. This book served dual purposes: as a practical manual for players and as an educational resource for teachers and parents. At a time when Chinese players often lacked access to game manuals—many of which were in Japanese or English—FU's guidebook offered clear instructions, tips, and strategies for navigating popular games of the era.

Beyond its practical use, the book also reflected FU's broader educational philosophy. In the preface, FU boldly stated:

*“Television game consoles are better understood as home computers—fully functional machines that, with additional peripherals, can be used for typing, accounting, learning English and mathematics, programming, and even composing music.”*

This statement not only redefined the role of gaming consoles but also promoted their potential as tools for learning and creativity. FU classified games into categories such as puzzle games for cognitive training and action games for improving reflexes. These classifications, presented from an educator’s perspective, highlighted the potential educational value of video games—a stark contrast to the prevailing societal view that games were a waste of time or morally harmful.

*Television Games: A Quick Guide* was groundbreaking in its accessibility and impact. Drawing heavily from gaming magazines in Hong Kong and Taiwan, it provided not only game walkthroughs but also evaluations and ratings—essentially functioning as an early review platform akin to modern-day websites like IGN or Metacritic. The book’s success was unprecedented, with five reprints in one year and total sales exceeding 250,000 copies, making it a record-breaking scientific publication in Fujian province.

### **3.3. Inspiring Commercial Education Computers**

The development of commercial education computers in China represents a unique convergence of technological adaptation, market-driven innovation, and institutional support. While educational computing systems such as the BBC Micro in the United Kingdom were products of centralized planning, China’s approach integrated both grassroots ingenuity and top-down initiatives to address the challenges of resource scarcity.

A major milestone in this process was the introduction of the China Educational Computer (CEC) in 1986. Developed as part of a government-led initiative, the CEC marked a significant step toward the localization of global computing trends. The system demonstrated the ingenuity of Chinese engineers in reverse-engineering advanced technologies and adapting them to local needs. Despite its importance in promoting access to computing, the CEC remained relatively expensive and lacked the appeal of popular gaming cartridges, such as those used by Nintendo. Consequently, it did not achieve mass-market penetration, as its high cost and limited game compatibility made it less accessible for ordinary households.

However, the CEC was not an isolated initiative. It was part of a broader national effort that also included the government-supported *electrified education* or *e-education* program. This initiative aimed to integrate modern technologies, including computers, into Chinese classrooms and schools. The electrified education program, which included the use of projectors, audio and video equipment, and eventually computers, sought to modernize education across rural and urban areas alike. The CEC, with its basic educational capabilities and affordability, was positioned as an important tool in these efforts to transform the educational landscape of China.

Through the electrified education program, the Chinese government sought to integrate computers into the learning process as part of a larger drive for modernization. The government also offered financial support to make computers more accessible. The CEC was seen as an essential step in achieving this goal, even though its high cost and limited features made it less widespread compared to other alternatives.

FU Zan’s promotion of game consoles as educational tools fit perfectly within this larger national strategy. In his book, *Television Games: A Quick Guide*, FU described how game consoles could be paired with keyboards to create multifunctional devices capable of teaching typing, programming, and other fundamental skills. This concept resonated with manufacturers like Subor Company, which developed educational computers combining Famiclone with limited BASIC programming functions. These devices played a significant role in bridging the gap between technology and education, particularly in lower-income households.

In this context, the CEC and the electrified education program reflected a combination of government support and grassroots innovation. While government programs provided institutional backing for technological education, innovations in the commercial sector—such as the Subor educational computer—enabled widespread access to computer literacy tools. This convergence of

top-down policy and market-driven innovation provided a more accessible pathway for ordinary families to engage with technology and education, helping to overcome economic and resource barriers.

Through these efforts, FU Zan and his contemporaries helped lay the foundation for China's digital literacy movement, demonstrating that education could thrive through a combination of institutional support, market-based solutions, and creative adaptation of existing technologies. This model continues to provide valuable lessons for addressing educational challenges in resource-constrained environments, where innovation and accessibility are key to empowering future generations.

## 4. Cultural and Social Impact

### 4.1. Bridging Accessibility and Aspirations

The impact of FU Zan's innovations extended far beyond his immediate educational contributions, shaping the cultural and social landscape of China's technological awakening. His work reflected a broader aspiration shared by millions of Chinese families: the dream of bridging the gap between traditional living and a modern, technology-driven future.

In the context of China's modernization efforts during the 1980s and 1990s, educational computers emerged as a transformative tool for bridging the gap between technological aspiration and accessibility. At a time when personal computers were prohibitively expensive, educational computers provided an affordable alternative, offering ordinary families a pathway to engage with modern technology.

FU Zan's initiatives were pivotal in this landscape. By promoting video game consoles as multi-functional devices, FU contributed to reframing technology as both a practical tool and a symbol of modern living. This approach resonated deeply with the national goals of the Four Modernizations, particularly the emphasis on scientific and technological advancement. The educational computers became not just an educational device but also a cultural artifact, embodying the hopes of millions of families for a better future.

The affordability of educational computers also reflected the economic ingenuity of the era. Devices like Subor's education computers combined gaming with IBM-PC keyboard arrangement, catering to both children's entertainment and parents' educational aspirations. These machines served as an entry point for computer literacy, allowing children to develop foundational computing skills while addressing the broader societal goal of modernization.

Through this dual role, educational computers became a symbol of upward mobility and modernity. They exemplified how technology could be adapted to meet the unique socio-economic conditions of a developing nation, fostering a generation of digitally literate citizens prepared for a rapidly changing world.

### 4.2. The Digital Youth Palace: A Continuation of the Vision

FU Zan's commitment to integrating education with technology did not end with his work on video games and education computers. In 2005, after leaving Fuzhou No. 16 Middle School, he became the director of the Fuzhou Educational Technology Center. There, he continued to champion innovative approaches to education, culminating in the creation of the **Digital Youth Palace** —a groundbreaking online platform designed to promote edutainment and digital literacy.

The Digital Youth Palace was conceptualized as a virtual extension of traditional youth centers, offering a curated collection of educational games and resources. Unlike conventional gaming platforms, its content was carefully designed to balance entertainment with learning, ensuring that children could enjoy engaging activities without the risk of overindulgence. Parents found reassurance in the platform's focus on health and education, while children were drawn to its interactive and stimulating offerings.

The platform's success was remarkable. According to FU Zan, the Digital Youth Palace boasted over 60 million registered users and daily active users exceeding 20,000 at its peak. This

widespread adoption underscored the enduring relevance of FU's philosophy: that technology, when thoughtfully applied, could bridge generational gaps, inspire learning, and foster a culture of curiosity.

By extending his vision to the digital realm, FU demonstrated the adaptability of his educational ideals. The Digital Youth Palace not only preserved his legacy but also showcased the evolving potential of technology as a medium for education. It remains a testament to his belief in the transformative power of combining education and entertainment.

FU Zan's contributions extended beyond individual innovations; they encapsulated the ethos of a transformative era in China. By reimagining the role of gaming technology, he challenged the prevailing narrative that video games were inherently detrimental to education and morality. Instead, he presented a compelling vision of games as tools for empowerment, creativity, and learning.

His work also highlighted the potential of grassroots innovation in addressing systemic challenges. At a time when centralized, state-driven approaches dominated global educational technology initiatives, FU's achievements demonstrated the power of adapting existing resources to local contexts. Through his efforts, learning machines became not only a technological phenomenon but also a cultural and social movement, reshaping perceptions of what was possible in education and technology.

## **5. Lessons from FU Zan's Legacy**

### **5.1. Adaptation and Creativity in Technological Education**

FU Zan's contributions to educational technology and computer literacy offer valuable lessons that extend far beyond their immediate historical and cultural contexts. His work underscores the importance of creativity and adaptability in leveraging technology for social and educational transformation, providing insights into how resource-constrained environments can foster innovation.

FU Zan's work serves as a powerful case study in the adaptation of technology for educational purposes. While educational computing systems like the BBC Micro in the United Kingdom were designed through government-led initiatives and centralized planning, China's commercial educational computers relied on grassroots creativity and market-driven innovations. This contrast highlights two distinct approaches to technological education: systematic design versus adaptive ingenuity.

The BBC Micro represented a meticulously engineered system tailored for classroom environments, emphasizing robust performance and educational functionality. Its development, backed by the BBC and executed by Acorn Computers, was part of a national campaign to enhance computer literacy. In contrast, China's education computers, exemplified by devices like the Yuxing educational computer, emerged from economic necessity and technological resourcefulness. These devices were not products of large-scale governmental programs but of local entrepreneurs and educators responding to the unique constraints of the Chinese market.

FU exemplified this adaptive approach by leveraging existing game consoles and reverse-engineered components to create affordable educational tools. His advocacy for using video games as teaching aids aligned with the economic realities of his time, making technology accessible to a broader audience. This pragmatic creativity not only democratized access to computing but also fostered a generation of students who saw technology not as an abstract concept but as an integral part of their daily lives.

### **5.2. Broader Implications**

The phenomenon of education computers in China holds broader implications for global discussions on technology and education. It demonstrates how innovation can thrive even in resource-constrained environments as long as there is a clear understanding of localized needs and aspirations.

One key lesson from FU's legacy is the importance of aligning technological tools with cultural and economic contexts. While the BBC Micro catered to the UK's structured educational system, China's education computers addressed the dual demands of affordability and multifunctionality. This adaptability ensured their widespread adoption, even in rural and less affluent areas.

Moreover, FU's emphasis on combining entertainment with education offers a valuable model for integrating technology into learning. His work underscores the potential of gaming and interactive media to engage students in ways traditional methods cannot. In an era where digital literacy is increasingly critical, FU's philosophy of "edutainment" remains highly relevant, offering insights for policymakers, educators, and technologists worldwide.

Finally, the success of education computers in China underscores the transformative potential of localized innovation. By reimagining global technologies to fit regional needs, FU and his contemporaries demonstrated that progress does not always require cutting-edge advancements. Instead, it often depends on the creative adaptation of existing resources to solve specific problems, a lesson that remains pertinent for addressing educational challenges in diverse contexts today.

### **5.3. Reflections on FU Zan's Legacy**

FU Zan's contributions remind us that educational technology is as much about people and their aspirations as it is about hardware and software. His ability to repurpose game consoles into tools for learning reflects a broader principle: the most impactful innovations often arise not from abundance but from necessity. By bridging the worlds of gaming and education, FU Zan helped redefine what was possible in a time of significant technological and social change.

His legacy underscores the importance of adaptability and resourcefulness in technological education. It challenges us to think beyond traditional paradigms of innovation and to seek solutions that are inclusive, equitable, and responsive to the needs of diverse communities. As the world continues to grapple with questions of computer literacy and technological access, FU Zan's work remains a source of inspiration and a reminder of the transformative power of human ingenuity.

## **6. Conclusion**

FU Zan's contributions exemplify a unique fusion of education, technology, and creativity, highlighting how grassroots ingenuity can drive meaningful change even in resource-constrained environments. His innovative approach to using video game consoles as educational tools not only redefined the potential of gaming technology but also addressed the broader societal challenge of computer literacy during China's early modernization efforts.

By advocating for education computers that combined affordability with practical functionality, FU bridged the gap between aspiration and accessibility for millions of Chinese families. His initiatives demonstrated how technological tools could be adapted to meet local needs while fostering engagement and curiosity among young learners. This approach aligned with the national priorities of the time, particularly the Four Modernizations strategy, which emphasized the importance of technological progress in national rejuvenation.

FU's legacy also underscores the power of "edutainment"—the integration of education and entertainment—as a model for teaching in the digital age. His recognition of games as gateways to computing skills was ahead of its time, providing a blueprint for how interactive media can be leveraged to cultivate computer literacy and critical thinking.

Looking ahead, the lessons from FU's work remain profoundly relevant. In an increasingly interconnected world, the need to balance innovation with inclusivity has become more pressing than ever. FU's efforts remind us that education technology must not only embrace cutting-edge advancements but also prioritize accessibility, adaptability, and cultural relevance.

Ultimately, FU's story is not merely about the past—it is a call to action. It challenges educators, policymakers, and technologists to rethink the role of technology in education, ensuring that it serves as a bridge rather than a barrier. By building on his legacy, we can continue to explore the untapped potential of combining creativity, technology, and education to inspire the next generation of learners and innovators.

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