Unleashing Human Potential: 
Education for the Second Wave of Outer Space Development

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Abstract

The first wave of outer space development in the last half of the 20th century changed the world. This first wave brought about a revolutionary satellite telecommunications system and the globalization of new high tech products and services. The second wave of outer space development is now characterized by the privatization of space tourism and space mining on one hand, and the international collaboration and sharing of outer space research and resources on the other. The aim of this paper is to describe how a new education paradigm will serve this second wave of outer space development. Education for outer space development is simultaneously appropriate for a globalized economic system, our socially interconnected global family, and the empowerment of previously disenfranchised peoples, which characterize the 21st century. The global systemic changes in the 21st century can close knowledge gaps and provide for greater equity and worldwide participation in outer space research and development. Curriculum using the new paradigm will inspire the desire for knowledge and development of creative skills to realize this engagement. In effect, an educational system that unleashes human creativity and curiosity will empower students with the knowledge and competencies not only for the second wave of outer space development, but also for the global engagement necessary for the 21st century and beyond.

The first wave of outer space development changed the world. This wave included the creation of a revolutionary satellite telecommunications infrastructure in the geostationary orbit. It also resulted in the globalization of new high tech products and services. For example, widespread global use of cell phones, the Internet, social networks, and wireless financial transactions all appear to have happened overnight. Telecommunications technologies coming
from the space programs have revolutionized how we communicate. However, wider social inequality gaps also developed during this time.

The second wave of outer space development began with the legalization of private spaceship travel, the plan to retire the NASA space shuttle fleet, and the preparation of companies to take on space transport from Low Earth Orbit to Earth, space transportation systems and space exploration missions to Near Earth objects (i.e. asteroids), Mars, the moons of Mars and our Moon. The Obama Administration’s recent decisions to cancel NASA’s Constellation Program and to set new space policy initiatives, gave a “green light” for emerging industries, such as space travel, space tourism, spaceport development, commercial space mining and space habitats. These new industries are likely to drive the global economy for decades. They are likely to have even greater impact than did first wave industries like aerospace and telecommunications.

Since 1957 and continuing today, the various space laws and policies governing outer space development have viewed the US laws as models for industrial development, even for outer space. Even with the NASA Space Shuttle program now closed, companies are speeding up private spaceship development. The NASA Authorization Act of 2010 allocates 58.4 billion dollars for space related business ventures. These ventures include plans to build advanced space transportation systems, privatize spacecraft development, commercial space habitats, space stations and space settlements, commercial space mining, spacecraft trajectory optimization for landing on near Earth asteroids, commercial spaceport construction, interstellar-interplanetary-international telecommunications and space exploration missions to near Earth asteroids, the Moon, Mars and Mars’ two moons – Phobos and Deimos. Space mining projects are boosted by discoveries of platinum group metals such as iridium and osmium, and various other valuable untapped natural resources. The second wave of outer space development will involve industries that make possible new life support systems, telecommunications, transportation, and back up habitats.

Today, the international community is experiencing multiple crises: From economic recession, to natural disasters, to violence and war, to poverty, unemployment, and disenfranchisement, to failing educational programs and widening inequality gaps, to political instability and revolutions. In the USA, the wars in Iraq and Afghanistan failed to jump-start the economy. The banks and auto industry crashed. Wall Street collapsed. Millions lost their homes to foreclosure. Poverty and homelessness are increasing, and many suffer from depression and other psychological disorders. Both domestically and internationally, we currently lack the political leadership and popular consensus for ways to end these crises. We find ourselves in the midst of the global systems revolution: Moving from the industrial age to the global-information-digital age. The second wave of outer space development represents one dimension of this shift. It contains key characteristics of the new Information Age, the Global Century, or the 21st Century Enlightenment Paradigm.

Legal rights to space resources have been clarified and a green light has been signaled via the rapid changes in space policy. Some of the more capital rich corporations and private enterprises have positioned themselves to take advantage of the new laws and policies to benefit from developing new space industries. They do not seem opposed to more people benefitting. However, they are moving forward quickly. They seem to realize that their success will depend on a reorganization of business models to be inclusive of diverse, interdisciplinary talent pools of individuals and teams working cooperatively across ideological, disciplinary, cultural, and
language differences. It is more likely that well-coordinated international consortia and federations will supersede traditional corporations and private enterprises.

A new trend is in place towards international cooperation for space exploration and missions. For example, The Global Exploration Strategy involves 14 space agencies (Australia, Canada, China, Europe-ESA, France, Germany, India, Italy, Japan, Russia, South Korea, United Kingdom, United States of America, and Ukraine) doing joint ventures in lunar architecture and other space goals. The space community is various international. The International Astronautical Federation is made up of thousands of space organizations, clubs, institutions, agencies, institutions, companies and groups which exist and are actively engaged in space activities for the development of outer space. However, something more is needed. International cooperation is only one part. More people need to become knowledgeable about newly emerging space industries. In order to facilitate networks between everyday people and the space community, a nonprofit corporation called The Global Alliance for Outer Space Development, Inc. was formed in 2011 to enable people all around the world to reeducate themselves so that they can prepare for new types of career paths. This Alliance will serve as a central network to link the global general public to relevant emerging trends related to evolving space industry phenomena. The Alliance will provide educational programs, knowledge building services and products, and workforce development and retraining resources for people of all ages and all walks of life.

The new industries potentially will open opportunities for education (disciplines, areas of study), professional growth, and ultimately new jobs and new careers. In the first wave, outer space development was limited to studies and professions in the sciences, technologies, business and policy making. The second wave industries are likely to involve those fields as well, but will require skill sets from the social sciences, humanities, languages, and the arts, and perhaps more importantly, individual trained in interdisciplinary and integrative research across multiple disciplines and languages. Space tourism, space hotels and space settlements, for example, require skill sets in the social sciences (psychology, anthropology and sociology). Earth-based social services -- restaurants, cafes, health clinics, hair dressers, communications systems -- would require re-invention, redesign and re-engineering to service civilian travelers in outer space. New human sustainability models will require testing and validation of their appropriateness in outer space. As knowledge coalitions plan, design, construct and test human habitats, life support systems, transportation vehicles and communications devices, ingredients for new knowledge products will emerge.

Most importantly, this knowledge can be disseminated universally to people throughout the planet. This opens the door for global equality of opportunity, universal access to resources, quality education and justice for all. Not surprisingly this outcome is consistent with the Outer Space Treaty’s requirement that outer space be used to benefit all humankind.

This second wave of outer space development will impact educational institutions worldwide (pre-K - 12 and universities). First, it means that space studies and outer space development needs to be included across the curriculum and across all levels. For many years space studies have remained the exclusive purview of engineers, scientists and technology experts. It is important to approach the topic using interdisciplinary and integrative approaches. Disciplines that were excluded in the first wave, especially the social and behavioral sciences, play a significant role in enabling young students -- the future global citizens -- to feel involved and empowered to contribute to the new enterprise. This educational approach will enable more
people to develop the new diverse skill sets required for the emerging outer space development industries.

The proposed curriculum focuses on developing intellectual talent for K-12 learners, workforce members needing to be retrained, academics seeking to reinvent themselves, and university students. In this curriculum, students of all ages conduct research, locate and compile data, write and perform critical analytical analysis, and apply results to novel situations. Outer space development curriculum open creativity channels for children and adolescents.

Outer space development curriculum can enable students to develop new dimensions of thought and tap into their creativity to solve problems related to survival and prosperity. These skills are necessary employment skills for the international knowledge networks likely to be in demand in the second wave of outer space development. Moreover, it has the potential of being able to develop a generation of people, in all walks of life, to engage in the variety of issues facing global citizens of the 21st century. Such a curriculum is part of the process to develop universal consciousness, empathy, life-saving imagination and innovation, genius and the ability to tap into the 90 per cent of the brain which is seldom used.

The complex challenges for outer space development in the second wave require interdisciplinary work teams that include individuals with very diverse skills, expertise and perspectives. It will be important to include people from diverse backgrounds, cultures, professions and disciplines. The professional work teams require individuals with a variety of technical and scientific expertise, creative imagination, and ability to collaborate and communicate with others with diverse backgrounds and languages. Schools and universities will be expected to prepare their graduates to work comfortably in these international, intercultural, interdisciplinary work settings. Governments and educational institutions will be expected to ensure equity and equal access to quality education for its youth in order to draw from the most diverse and multicultural pool of student candidates possible.

Organizing school curricula for second wave outer space development can close inequity gaps, and knowledge/achievement gaps. We can imagine a movement involving people being retrained for new job opportunities. Since this second wave will require inclusion of people from broad diversity in all areas, the schools and universities which prepare this talent pool of workers, must have policies and practices that provide equality of opportunity and access to the quality education for all students. Educational institutions and agencies must provide everyone, rich or poor, the access to knowledge and information resources for gaining the competencies for work in the outer space development programs. This vision enables us to view outer space development as a means for solving the inequality gap problem that many scholars, activists and academics have complained about.

Curriculum using the new paradigm will inspire the desire for knowledge and development of creative skills to realize opportunities for enthusiastic participation and engagement in the second wave of outer space development. In effect, an educational system that unleashes human creativity and curiosity will empower students with the knowledge and competencies not only for the outer space development research and enterprises, but also for the global engagement necessary for the 21st century and beyond.

**Research Resources**
Spaceships
http://www.youtube.com/watch?v=aMJJe6o4ukY
http://www.youtube.com/watch?v=XBlifr6EQNU
http://www.youtube.com/watch?v=b5N1sNSYBKk
http://www.youtube.com/watch?v=atwBhIHRZ0U

Plan B Narratives
http://www.youtube.com/watch?v=90TWpYkJo0I
http://www.youtube.com/watch?v=ZPaadZzPGUK
http://www.youtube.com/watch?v=YPjXxKpM4DM
http://www.youtube.com/watch?v=Bk4XN3KtOCg
http://www.youtube.com/watch?v=ADFeSFkgwUI

Space Mining
http://www.youtube.com/watch?v=wYaf2ZE6LvY
http://www.youtube.com/watch?v=AMOijvbKcd0
http://www.youtube.com/watch?v=ff77vfhgIMk
http://www.youtube.com/watch?v=qKoQUrKeNuQ

Space Tourism
http://www.youtube.com/watch?v=NObAsTP9T6U
http://www.youtube.com/watch?v=5C4PbhJYng

Space Habitats
http://www.youtube.com/watch?v=OqsHK2vxyzo
http://www.youtube.com/watch?v=AI6_8GK-R0I

New Missions
http://www.youtube.com/watch?v=aQ1Z-xtkdLA
http://www.youtube.com/watch?v=h6vn6liodH8
http://www.youtube.com/watch?v=-5IviadECfM
http://www.youtube.com/watch?v=QZP3H6Dz6TU
http://www.youtube.com/watch?v=SVJY5Hwasjo
http://www.youtube.com/watch?v=U3sPy0Uv8zY
http://www.youtube.com/watch?v=LHnY8acG0Zw
http://www.youtube.com/watch?v=Ow3eWrUx8bY
http://www.youtube.com/watch?v=ZmnON45Yh6Q

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