



# SPACE SCHOOL MUSICAL

TEACHING TIPS  
&  
GLOSSARY

**A KidTribe Production**

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### ACKNOWLEDGEMENT

**Space School Musical** is a partnership between NASA's Discovery and New Frontiers Programs and KidTribe. Kellee McQuinn created, wrote and directed the musical. Kellee and Dr. Gale K. Gorke created and wrote the Activity Guide. Shari Asplund, Discovery and New Frontiers Education and Outreach Manager, oversaw development and production of the musical and the accompanying guides.

Learn more @ <http://discovery.nasa.gov> and <http://kidtribe.com>

# TEACHING TIPS



## Getting It Started!

### How to Use this Guide

This scripted guide can be used in conjunction with producing the play or stand alone to help students integrate the content and concepts.

First, have the students watch the DVD of *Space School Musical* a few times to introduce them to the material and get them jazzed about the content. It is also highly recommended to review each song on the DVD before beginning the correlating activities and use the music to enhance the activity.

The lesson plans in the curriculum guide are all based on the content from the musical. They are designed to be highly engaging and help students interact with the information. Completely self-contained and adaptable, they can be used independently, intermittently, or in a series... basically this guide is moldable to fit your needs and desired outcomes. We recommend about 30 minutes for each activity, although the allotted time limit is also adaptable.

### Differentiation

The lesson plans are designed to be developmentally appropriate for upper elementary and middle school students. Each lesson can be easily adapted for students of various abilities by adjusting the content and product of the lesson. Many activities also encourage small group or partner work.

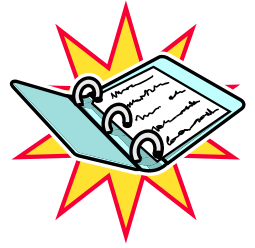
### Integrated Curriculum

Although the study of science and understanding the solar system is the basis for all of the lesson plans, the activities in this guide are inclusion based and designed for the whole child, helping to enhance students' physical fitness levels, life skills and decision making processes, visual and performing arts abilities, as well as academic performance in all the core subjects.

### Multiple Intelligences

In designing the lesson plans, care was taken in making sure all students would have the chance to share their innate talents. The activities allow for students to express their linguistic, mathematical, logical, spatial, musical, kinesthetic, interpersonal, and intrapersonal skills.

# TEACHING TIPS



## Keeping It Going!

### **Classroom Management**

When students are actively engaged in their learning, their behavior remains positive and productive. These activities allow for the teacher's focus to be on managing the learning, rather than managing the behavior. Giving students clear instruction, one direction at a time, and demonstrating a positive example towards learning helps to insure students stay on task. Clear expectations, consistent cues for activity starts, stops, and transitions, along with a positive rapport, encourage students to be self-regulating.

### **Cooperative Learning**

Students create and sustain a positive learning environment by working in small groups or with a partner. They are not only encouraged to get along, solve problems, and adapt to one another, but to get things done together.

### **21<sup>st</sup> Century Skills**

In addition to meeting integrated academic standards, the lesson plans are designed to help encourage students to develop necessary skills to be successful citizens in the 21st Century. These include leadership, cooperation, creativity, communication, collaboration, problem-solving, and critical thinking.

### **Learning Process**

Whether students absorb information best with their eyes, ears, or body, each lesson plan allows for their learning preferences and encourages them to interact with both the content and each other.

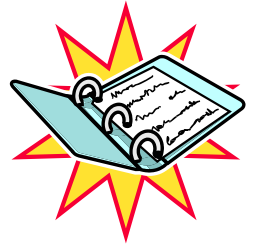
The lesson plans presented here encourage a three step process in learning:

First, students are exposed to the content and explore it through a variety of creative, right-brained modalities like music, art, and physical activity.

Second, students are allowed to develop their understanding of that content through engaging activities that develop academic, critical thinking, and decision-making skills.

Finally, through creative self expression, students are provided opportunities to share their learning with others, cooperatively and collaboratively.

# TEACHING TIPS



## Seeing It Done!

### Showing Off Their Work

Working towards a goal, accomplishing it, and sharing the finished result with friends and family is one of the most rewarding, esteem building experiences a person can have. For some students, the journey of "the process" is enough of a motivator. But for most, showcasing their hard work, creative ideas, and finished product is what inspires them to do their best.

The most obvious is to perform a production of *Space School Musical* for an audience. But there are other showcase ideas such as art shows, bulletin boards, publishing, cross-aged sharing, and contests. Have fun with it. Be creative.

### Connecting to the Family

Learning shouldn't just happen at school. Give students "homeplay" where they can take some of the activities back to their families to integrate the concepts and work together as they learn together! Host a family night where parents and children are both participants, joined together in teams or even competing against one another.

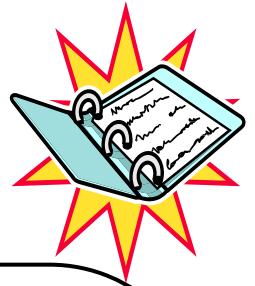
### Connecting to the Community

To take the excitement a step further, collaborate with the local community and display students' work in places throughout the neighborhood. Bring in local experts as instructors or judges of contests. Invite government officials to special events. This will strengthen the relationship between the school or program, the students, and the city, creating a common bond inspired by the children.

**Find More Activities @**

<http://discovery.nasa.gov/interactive/activities.html>

# GLOSSARY



## TERMS USED IN SONGS:

**Accretion-** Accumulation of dust and gas onto larger bodies such as stars, planets and moons.

**Asteroid-** One of billions of rocky objects, less than 1000 km in diameter, which orbit the Sun. Also known as minor planets. Thought to be planetesimals leftover from the formation of the planets. The first asteroid (Ceres) was discovered by Giuseppe Piazzi in 1801. More than 10,000 asteroids have so far been discovered and given permanent identification numbers. The largest asteroid is 2001 KX76 with a diameter of at least 1200 km.

**Asteroid belt-** Region between the orbits of Mars and Jupiter which is populated by billions of asteroids.

**Astronomical Unit** An AU is a measurement of the distance from Earth to the Sun. One AU is equal to 93 million miles (15 million km). Pluto, by comparison, is 39 AUs from the Sun.

**Atmosphere-** The gas that surrounds a planet or star. The Earth's atmosphere is made up of mostly nitrogen, while the Sun's atmosphere consists of mostly hydrogen.

**Big Bang-** A theory of cosmology in which the expansion of the universe is presumed to have begun with a primeval explosion, referred to as the "Big Bang," in which all matter and radiation in the entire universe came into being.

**Biosphere-** The portion of Earth and its atmosphere that can support life.

**Black hole-** An object with so much mass concentrated in it and such a strong gravitational pull that nothing, not even light, can escape from it. One way in which black holes are believed to form is when massive stars collapse at the end of their lives.

# GLOSSARY



**Comet-** Icy body which orbits the Sun. Thought to be leftover planetesimals from the formation of planets in the outer Solar System. The small, solid nucleus consists of water and other ices coated with dark organic compounds. As the nucleus approaches the Sun, it vaporizes, creating a coma and two main tails. These tails - one made of gas and one of dust - may stream million of kilometers into space, and almost always point away from the Sun. Some 'dead' comets, which no longer display a coma or tails, resemble asteroids.

**Crater-** Basin-shaped depression in the surface of a planet or moon. May be caused by a comet or asteroid impact, or by a volcanic eruption. Usually circular as seen from above, impact craters often have a raised rim formed from material (ejecta) thrown out by the collision. Larger impact craters have central mountain peaks. Volcanic craters may contain lava which is supplied from subsurface magma. They are surrounded by material produced during previous volcanic eruptions.

**Cryosphere-** The term cryosphere collectively describes the portions of the Earth's surface where water is in solid form, including sea ice, lake ice, river ice, snow cover, glaciers, ice caps, and ice sheets, and frozen ground which includes permafrost.

**Dawn-** A NASA spacecraft that will be the first ever to orbit two bodies in one mission. It is en route to asteroid Vesta and dwarf planet Ceres.

**Dust-** Irregularly shaped grains of carbon and/or silicates measuring a fraction of a micron across which are found between the stars. Dust is most evident by its absorption, causing large dark patches in regions of our Milky Way Galaxy and dark bands across other galaxies.

**Electromagnetic spectrum-** The full range of frequencies, from radio waves to gamma-rays, that characterizes light.

**Elliptical orbit-** An orbit which describes an ellipse or oval shape.

# GLOSSARY



**Fusion-** The process in which atomic nuclei collide so fast that they stick together and emit a large amount of energy. In the center of most stars, hydrogen fuses into helium. The energy emitted by fusion supports the star's enormous mass from collapsing in on itself, and causes the star to glow.

**Galaxy-** A component of our universe made up of gas and a large number (usually more than a million) of stars held together by gravity. When capitalized, *Galaxy* refers to our own *Milky Way Galaxy*.

**General relativity-** The geometric theory of gravitation developed by Albert Einstein, incorporating and extending the theory of special relativity to accelerated frames of reference and introducing the principle that gravitational and inertial forces are equivalent. The theory has consequences for the bending of light by massive objects, the nature of black holes, and the fabric of space and time.

**Geosphere-** Refers to the densest parts of Earth, which consist mostly of rock and regolith.

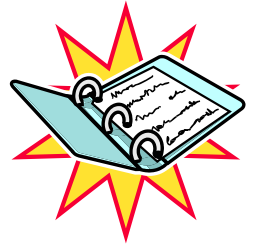
**Gravity-** The fundamental force of attraction that all objects with mass have for each other. At the atomic level, where masses are very small, the force of gravity is negligible, but for objects that have very large masses such as planets, stars, and galaxies, gravity is a predominant force, and it plays an important role in theories of the structure of the universe.

**Gyration-** Circular or spiral motion.

**Hale-Bopp (comet)-** The brightest comet to appear in the night sky for many decades. Discovered by Alan Hale and Thomas Bopp on 22 July 1995, it was visible by the naked eye for many months in 1997. Its nucleus appears to be very large, about 40 km across.



# GLOSSARY



**Halley (comet)-** The most famous periodic comet, it returns to the inner solar system every 76 years. Named after the 17th century British scientist, Edmond Halley, who first recognized its regular pattern of reappearances. Studied by a fleet of spacecraft during its 1986 appearance.

**Helium-** The second lightest and second most abundant element. The typical helium atom consists of a nucleus of two protons and two neutrons surrounded by two electrons. Helium was first discovered in our Sun. Roughly 25 percent of our Sun is helium.

**Hydrogen-** The lightest and most abundant element. A hydrogen atom consists of one proton and one electron. Hydrogen composes about 75 percent of the Sun, but only a tiny fraction of the Earth.

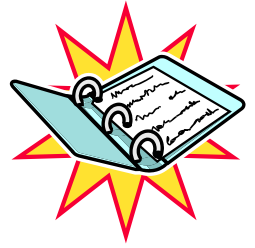
**Kepler-** A NASA space mission that is searching for Earth-sized planets around other stars.

**Kuiper Belt-** A region of the solar system beyond the orbit of Neptune populated by comets, asteroids, and other 'ice dwarfs', otherwise known as Kuiper Belt Objects or trans-Neptunian objects. Several hundred of these have so far been discovered. The dwarf planet Pluto appears to be the largest of these objects. The belt seems to occur at 30 - 150 AU from the Sun and is believed to be the source of short-period comets. Named after Dutch-American astronomer Gerard Kuiper who predicted its existence.

**Magnetosphere-** The region of space in which the magnetic field of an object (e.g., a star or planet) dominates the radiation pressure of the stellar wind to which it is exposed.

**Mass-** A measure of the total amount of material in a body, defined either by the inertial properties of the body or by its gravitational influence on other bodies.

# GLOSSARY



**Meteor-** Brief streak of light seen in the night sky when a speck of dust burns up as it enters the upper atmosphere. Also known as a shooting star or falling star.

**Meteor shower-** A group of meteors which appear to radiate from the same part of the sky and which occur over a limited period of a few days or hours. Dozens of annual showers are known though only a few give significant regular displays.

**Meteorite-** A fragment of rock that survives its fall to Earth from space. Usually named after the place where it fell.

**Meteoroid-** A piece of rock or dust in space with the potential to enter Earth's atmosphere and become a meteor or meteorite.

**Methane-** A colorless and odorless gas that belongs to the alkane series of the hydrocarbons.

**Milky Way-** Our Galaxy seen as a misty band of light which stretches across the night sky. The Milky Way contains about one hundred million stars. It has the shape of a disk with a diameter of about 100,000 light-years. The Sun lies about two-thirds of the way towards the edge of the disk from the center.

**Mission-** An investigation designed to carry out the goals of a specific program: *a space mission.*

**Moon-** The Earth's natural satellite - 2,160 miles in diameter, 238,857 miles away; any planetary satellite: *the moons of Jupiter.*

**Moonquake-** A quake or series of vibrations on the moon similar to an earthquake but usually of very low magnitude.

# GLOSSARY



**Nuclear fusion-** A nuclear process whereby several small nuclei are combined to make a larger one whose mass is slightly smaller than the sum of the small ones. The difference in mass is converted to energy by Einstein's famous equivalence "Energy = Mass times the Speed of Light squared". This is the source of the Sun's energy.

**Oort cloud-** Dutch astronomer Jan Oort predicted in 1950 that a cloud of small icy objects existed far outside of the solar system, as far as 100,000 AU. Today, the Oort cloud is believed to be a vast reservoir of ice dwarfs and the source of comets in our solar system. The Oort cloud defines the outer limit of the Sun's gravitational influence.

**Planet-** Large, spherical ball of rock and/or gas which orbits the Sun or another star.

**Propulsion-** Process by which something can be moved by producing a reaction with a force of thrust.

**Revolution-** The orbiting of one heavenly body around another.

**Rings of Saturn-** Among the most recognizable features in the solar system, Saturn's beautiful rings spread over hundreds of thousands of miles, yet they are extremely thin - perhaps only about 30 feet thick. The rings consist of billions of individual particles of mostly water ice which create waves and wakes. They also contain some dust and other chemicals.

**Rotation-** The movement or path of the Earth or any heavenly body turning on its axis.

**Satellite-** A body that revolves around a larger body. For example, the Moon is a satellite of the Earth.

**Solar flare-** Violent eruptions of gas on the Sun's surface. They usually last only a few minutes, but their temperatures may reach hundreds of millions of degrees. Most of their radiation is emitted as X-rays, but they can also be observed in visible light and radio waves. Charged particles ejected by flares can cause aurorae when they reach the Earth a few days later.

# GLOSSARY



**Solar System-** The Sun and the collection of celestial bodies that orbit it. These include the eight planets (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune) and their moons, dwarf planets, the asteroid belt, the comets and the Kuiper belt.

**Solar wind-** Stream of plasma, mainly electrons and protons, which flows from the Sun's corona at up to 900 km/s. It is found throughout the solar system as far away as the heliopause.

**Space-** The unlimited great three-dimensional expanse in which all material objects are located and all events occur. The regions beyond the gravitational influence of Earth encompassing interplanetary, interstellar, and intergalactic space.

**Star-** Giant ball of gas in space which produces vast amounts of energy through nuclear reactions in its core. There are many different types of stars, which are classified according to their temperatures, colors, ages and compositions.

**Stardust-** A NASA space mission that collected particles of comet dust from the nucleus of comet Wild 2 and returned the samples to Earth in 2006.

**Sun-** Our nearest star and the central object in the solar system. Compared with other stars it is fairly average in terms of size and temperature. It seems to have formed from a cloud of dust and gas about 5 billion years ago. A giant ball of gas, mainly hydrogen and helium, it contains 745 times as much mass as all of the planets put together. Energy is generated through nuclear fusion in its core. The temperature of the core is about 15 million degrees Celsius, while the temperature of its visible surface (the photosphere) is 5700 °C. Above the photosphere are the chromosphere and the corona, where the temperature exceeds one million degrees. The energy generated in the core takes 30 000 years to reach the surface, when it is mostly emitted as light and infrared (heat) radiation.

# GLOSSARY



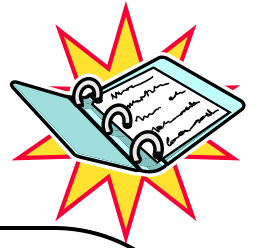
**Telescope-** Instrument designed to aid the observation of remote objects by collecting some form of electromagnetic radiation such as visible light.

**Terrestrial planets-** The four innermost planets in the solar system, which have solid rocky surfaces.

**Trajectory-** The path of a projectile or other moving body through space.

**Universe-** Everything that exists. The size of the observable Universe is determined by the distance light has travelled since the Universe was formed in the Big Bang, 12 - 15 billion years ago.

# ABOUT THE AUTHORS



## Kellee McQuinn

The creator of *Space School Musical*, Kellee is nicknamed "the Pied Piper with a Boom Box" by the LA Times. In 2002 she founded **KidTribe**, an international children's obesity prevention fitness and nutrition program, and has single-handedly evoked a new paradigm of physical education with her trend-setting activities and cutting-edge approach. With millions of participating kids and teachers the US and the UK, KidTribe creates a positively contagious environment where being healthy and learning are cool. An inspiring speaker, a motivating instructor, an out-of-the-box educator, and an energetic performer, Kellee empowers hundreds of thousands of lives each year.

Being the creative force behind KidTribe, she has also written, directed, choreographed, and starred in several award winning KidTribe videos and DVDs along with appearing on numerous children's television shows and many news segments both in the US and internationally. An energetic entertainer, she has performed at The White House for the annual Easter Egg Roll where she danced and hooped it up with the First Family and recently created a dance/music video for Michelle Obama's "Let's Move!" initiative.

KidTribe serves thousands of schools and has partnered with such organizations as the US Department of Education, US Department of Health and Human Services, The First Lady's Let's Move Campaign, President's Council of Fitness, Sports and Nutrition, USDA Nutrition Network, California Department of Health Services, American Cancer Society, American Diabetes Association, American Camp Association, National After School Association, the Governor's Council on Physical Fitness, California Department of Education, YMCA-USA, CAHPERD, California Parks and Recreation Association, California School Age Consortium, numerous County Offices of Education, countless school districts and the UK's National After School Program.

Dancing since she was in the womb, Kellee hails from New Jersey and is the daughter of a successful dance teacher. Having the good fortune to grow up with a dance studio in her house, she understood from an early age the power that music and movement have on one's esteem and healthy self-image. At the age of fourteen, she began to teach at her mother's studio and after studying with top choreographers in NY, she headed to Colorado State University to explore her love of nature and philosophy. It was there that she began her studies for child development and dance therapy. Caught by "the bug", Kellee migrated west after college to pursue fame and fortune. While studying acting with master artists, she was featured in several television shows, national commercials and Equity theatre productions. But then came 9-11... and Kellee took a long, honest look at her life. Re-inspired and committed to making difference in the world, she returned to her roots... dancing with kids.

Currently Kellee resides in Venice, CA with her dog, Bear. When she's not being Peter Pan, she enjoys writing, dancing, going to the theater, shoe shopping, text messaging, traveling, sipping on green tea and sharing a hearty laugh with friends.

[www.kidtribe.com](http://www.kidtribe.com)

# ABOUT THE AUTHORS



## Dr. Gale K. Gorke

A dynamic speaker, trainer, and author, Gale is a veteran educator in the public school system for nearly 30 years. Specializing in both elementary and secondary levels, she has impacted the lives of hundreds of thousands of students, teachers, and administrators. In 2004 she created Kids Kan Inc., an international organization that specializes in curriculum design, staff development, activity selection, and program implementation. Her teaching style effectively models a keen awareness of adolescent development and brain-based learning principles, accommodating all students' ability levels.

A sought after consultant, Dr. Gorke is the chief curriculum specialist for KidTribe and also helped to author California state guidelines for inclusion and physical activity in afterschool programming throughout the state. An expert in kinesthetic learning through team building and psycho-motor activities, she has created programs for nationally recognized youth organizations.

Also on a national level, Gale has been instrumental in implementing grants funded through 21st Century Community Learning Centers, Carol M. White PEP grants, Mentoring Children of Prisoners grants, and the Office of Adolescent Pregnancy Prevention grants. She presents and keynotes at many educational conferences and provides technical assistance for multiple school districts, County Offices of Education, and community based organizations such as YMCA, Big Brothers, Boys and Girls Clubs, Departments of Health and Welfare, AmeriCorps, and Conservation Corps.

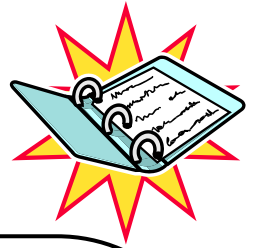
Gale has served as an adjunct professor in the School of Education for both La Sierra University and Chapman University. Her Ed.D. in Curriculum and Instruction focused on academic intervention in afterschool programs and her Ed.S. is in School Psychology.

Devotees of "Dr. Gale" all agree that her enthusiasm is contagious. Her motto is "The best way to learn is through play and the way you show up for the game is the way you show up for life."

[www.galegorke.com](http://www.galegorke.com)



# ABOUT THE AUTHORS



## Shari Asplund

Shari Asplund is the Education and Public Outreach Manager for NASA's Discovery and New Frontiers Programs of solar system exploration missions. With a B.A. in journalism, she first came to the Jet Propulsion Laboratory as a technical writer and editor, and later spent 10 years as a project and program administrator. Shari joined the Discovery Program when it was created in 1999. She works to connect students, teachers, and the public with these exciting space investigations in a variety of ways.

Shari writes the content for two web sites and writes and edits an award-winning newsletter that reports on the current status of each mission. She presents workshops to educators to help them connect their students to cutting-edge science and the questions that the missions are looking to find answers to. She has provided leadership among her peers in getting NASA science content into out-of-school time programs.

Shari works with educators to develop products and activities that bring the science and the meaning of the missions to students, to convey the great sense of adventure, excitement, and optimism that is space exploration. She was looking for ways to get kids up, moving, and having fun while learning about space science when she met Kellee McQuinn at a conference. She knew Kellee would be the perfect partner, and the result of their collaboration is *Space School Musical*, a totally innovative, engaging and timeless way to introduce kids to the solar system with songs, dancing, and smiles galore. Space is a very cool place!