



CONCORDIA CURRICULUM GUIDE



GRADE
4

Science



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P R E F A C E

Ministry of Christian Schools

Parental expectations of Christian schools include

- excellent discipline;
- high academic standards;
- low teacher-student ratios;
- dedicated, conscientious teachers.

Many Christian schools offer these advantages. But the real distinction is that Christian schools proclaim Jesus Christ as the Son of God and Savior of the world. Teaching Jesus Christ, then, is “the real difference” between Christian and public schools. In Christian schools, teachers and students witness personally and publicly to their faith in Jesus Christ. Students study the Bible and worship God daily. Teachers relate Jesus Christ to all aspects of the curriculum. Teachers and students share Christian love and forgiveness.

Those who teach in Christian schools are privileged with the opportunity to

- teach the Word of God in its truth and purity;
- acknowledge the Bible as God’s infallible Word and the Confessions as the true exposition of the Word;
- identify God’s Word, Baptism, and the Lord’s Supper as the means through which God creates and sustains faith;
- emphasize Law and Gospel as the key teaching of Scripture;
- seek to apply Law and Gospel properly in daily relationships with students, parents, and other teachers;
- teach all of what Scripture teaches (including Christian doctrines) to all students, no matter what backgrounds they have;
- share with students what Jesus, the Savior, means to them personally;
- equip students to proclaim the Good News to others;

- encourage students to find the support and encouragement found only in the body of Christ, of which Jesus Himself is the head.

In Christian schools, Christ permeates all subjects and activities. Religion is not limited to one hour or one class. Teachers seek opportunities to witness in every class and to relate God’s Word to all aspects of life. Through this process, and by the power of the Holy Spirit, students grow in faith and in a sanctified life, and view all of life, not just Sunday, as a time to serve and worship God.

In summary, it is intrinsic to ministry in a Christian school that all energies expended in the educational process lead each child to a closer relationship with the Savior and with other members of the Christian community.

How to Use This Guide

The Concordia Curriculum Guide series is designed to guide you as you plan and prepare to teach. The introductory chapters provide foundational information relevant to the teaching of science to students in a Christian school. But the majority of the pages in this volume focus on science standards and performance expectations together with ideas and activities for integrating them with various aspects of the Christian faith. This volume does not provide a curriculum plan or lesson plan for any particular period or day. Instead, it provides a wealth of ideas from which you can choose and a springboard to new ideas you may create. You may use this curriculum guide with any textbook series.

The science standards included in this book are informed by the Benchmarks for Science Literacy, published in conjunction with Project 2061 of the American Association for the Advancement of Science (AAAS) (see also ch. 3), and are provided as a compilation of the science standards and performance expectations adopted by the individual states. In order to offer a well-coordinated curriculum design, the science objec-

tives for this grade level relate to and connect with the standards provided at other grade levels.

The standards, then, can serve you and your whole faculty in several ways. They can help you

1. plan your teaching in an organized way;
2. coordinate your teaching of a subject with the teaching in other grades in your school;
3. select textbooks and other learning or teaching materials;
4. evaluate your current instruction, materials, and objectives;
5. implement procedures for school accreditation;
6. nurture the Christian faith of your students as you teach science.

We assume that teachers will use materials in addition to those included in the guide, but, since many materials do not integrate the Christian faith, we have provided suggestions for specific methods to use as you teach day by day. Everyone has a different teaching style. No one will be able to use all the ideas in this volume. As you think about practices that will work for you and would be helpful in your classroom, consider these possible ways to find and use ideas from this volume:

- Read the entire volume before school starts. Highlight the ideas you think you can use.
- Write ideas in your textbooks. List the page numbers from this volume that contain suggestions you would like to use in connection with a lesson or unit.
- Throughout the year, designate periods of time, perhaps at faculty meetings, to discuss portions of this volume as you seek to improve your integration of the faith in science. Brainstorm, develop, and implement your ideas. Then follow up with other meetings to share your successes and challenges. Together, find ways to effectively use the suggestions in this volume.

- Plan ways to adapt ideas not closely related to specific lessons or units in your secular textbooks. Inside your plan book, clip a paper with a list of suggestions from the volume that you would like to use, or list each idea on a file card and keep the cards handy for quick review. Use those ideas between units or when extra time is available.
- Evaluate each suggestion after you have tried it. Label it as “use again” or “need to revise.” Always adapt the suggestions to fit your situation.
- Think about integrating the faith each time you plan a lesson. Set a goal for yourself (e.g., two ideas from this volume each week), and pray that God will help you to achieve it. You will find the index at the back of this volume especially helpful in finding faith-connecting activities relative to specific topics.
- If the ideas in the Concordia Curriculum Guide series seem overwhelming, begin by concentrating on only one subject per month. Or attempt to use the suggested ideas in only two to four subjects the first year. Add two to four subjects per year after that.

Probably the most effective teaching occurs when teachers take advantage of natural opportunities that arise to integrate the faith into their teaching. In those situations, you will often use your own ideas instead of preparing a lesson plan based on teaching suggestions in this guide. Use the white space on the pages of this book to record your own ideas and activities for integrating the Christian faith. We hope this volume will be an incentive to you to create your own effective ways to integrate the Christian faith into the entire school day.

We believe that Christian schools are essential because we believe that our relationship with Jesus Christ permeates every part of our lives. That is why our Christian faith permeates our teaching. That is why we teach in a Christian school.

CHAPTER 1

Vocations in Science and Education

By

Nathan Jastram

Dr. Nathan Jastram was born and raised in Japan, the son of missionary parents. He received a bachelor's degree in classical languages at the University of South Dakota in Vermillion. He earned his master's degree in theology at Concordia Theological Seminary in Fort Wayne, Indiana. He then went on to obtain his doctorate in ancient Near Eastern languages and civilizations—with a dissertation on the Dead Sea Scrolls—from Harvard University (Cambridge, Massachusetts). He taught at Concordia University, River Forest, Illinois, from 1990 to 1999. Dr. Jastram has been teaching at Concordia University Wisconsin, Mequon, since 1999. He is currently the chairman of the theology division.

The Vocation of Scientist

Christian educators live out their vocation as they help others by word, attitude, and example to grow in knowledge, understanding, and skills while sharing with them the love of Jesus. Christians in the field of science serve God and others through their efforts to better understand and apply their understandings of God's creation. Although God has not specifically ordained the vocation of scientist in the Bible, the vocation of science is filled by people who love knowledge and search for wisdom, two attributes often praised in the Bible. Solomon urges, "Get wisdom, get understanding" (Proverbs 4:5 NIV), and rhapsodizes, "How much better to get wisdom than gold, to choose understanding rather than silver!" (Proverbs 16:16 NIV). The wisdom that is extolled so highly begins with the fear of the Lord: "The fear of the LORD is the beginning of wisdom" (Proverbs 9:10 NIV). It continues with the intricacies of creation: "By wisdom the LORD laid the earth's foundations, by understanding He set the heavens in place; by His knowledge the deeps were divided, and the clouds let drop the dew" (Proverbs 3:19–20 NIV). Before the fall into sin, Adam exercised his godly wisdom by engaging in the scientific activity of

naming animals (Genesis 2:19–20). Unlike those in the generations to follow him, Adam's understanding came directly from God; no human instruction was available or required.

Discovering How the World Works

When Adam fell into sin, his relationships with Eve, God, and the Earth became marked by disharmony, misunderstanding, and adversity. In some mysterious way, the Earth itself was affected. "Cursed is the ground because of you" (Genesis 3:17 NIV). The apostle Paul writes, "The creation was subjected to frustration, not by its own choice, but by the will of the one who subjected it, in hope that the creation itself will be liberated from its bondage to decay and brought into the glorious freedom of the children of God. We know that the whole creation has been groaning as in the pains of childbirth right up to the present time" (Romans 8:20–22 NIV).

The vocations of Christians who are scientists and of Christian educators are callings through which God shares understanding of the world. Scientists study God's creation to learn more about it. In recent times, it has become possible for scientists to work with the code of life itself as they experiment with DNA. This is a heady development that allows scientists to participate in the creative activity of God, the author and

designer of life. Christian educators help students both to understand the world and to find the purpose and significance of their life in the light of God's Word. They assist students as they grow and develop so they may know and appreciate the great value and worth of human life—their own and that of others—as uniquely designed by God and individually redeemed through Christ's life, death, and resurrection.

Demonstrating Love for God and Others

As Christian teachers teach about the created world and as scientists who are Christians work to extend human capabilities and quality of life, they do so with respect for all life and especially for human life. God took special care in creating Adam; He said, "Let Us make man in Our image, in Our likeness, and let them rule over the fish of the sea and the birds of the air, over the livestock, over all the earth, and over all the creatures that move along the ground. So God created man in His own image, in the image of God He created him; male and female He created them" (Genesis 1:26–27 NIV).

Fulfilling their calling, scientists who are Christians demonstrate their love for God and others. Scientists working in the field of medicine, for example, fight against disease so as to lessen its potency, completely eliminate it, or prevent it from happening in the first place. When scientists take on disease, they battle one of the effects of sin that entered the world after the fall.

Christian educators serve God as they assist in the process of human growth and development. They nurture, encourage, and help to mold young lives, celebrating each as God's gift, the object of His creative energy, and the holder of the potential He provides. Christian educators support and nurture each life through instruction rooted in God's Word and as they lift each student up in prayer.

The vocation of Christian educator includes the obligation to value, honor, and serve those God has given them to teach. Properly fulfilled, the vocation of Christian teacher relies on the strength and direction of the Redeemer to work

against sin, death, and Satan's power. Christian teachers teach all subjects so as to point students to the enlightening influence of the Savior and the free and rewarding new life He promises. Jesus said, "I am the light of the world. Whoever follows Me will never walk in darkness, but will have the light of life" (John 8:12 NIV).

Between Heaven and Earth

It is the mixture of the earthly and heavenly in human beings that sets them up for great successes and failures. Adam was created as a heavenly creature, in the image and likeness of God, but he was also an earthly creature, distinct from God. Adam's first great temptation was to deny his earthly limitations and grasp at becoming like God with respect to being the ultimate authority to determine what is good and evil. Humans are created to occupy a position between heaven and Earth, and the mixture between the earthly and the heavenly in us is the battlefield on which God and Satan fight. Satan constantly urges people to cast off the shackles of their earthly limitations and enjoy the unfettered prerogatives of their heavenly status. God, on the other hand, commands people to obey Him and to do all they do as His representatives, who, though earthbound, are already citizens of heaven (Philippians 3:20).

The offices of scientist and Christian educator are powerful and full of potential for good or evil. They are so powerful that the specter of these offices gone bad haunts the theologian. Those occupying positions in these offices who make themselves gods, caring nothing about the one true God or His laws of right and wrong, are devils incarnate. They have great power but refuse to acknowledge God's laws governing its use. At best, they are restrained from grievous evil only by their own sense of right and wrong. The scientist misuses his or her vocation when he or she refuses to acknowledge God's primacy, His created orders, or His revealed will. The Christian educator shuts out God when he or she teaches religion yet refuses to let our Savior and His love dominate his or her classroom, lessons, and relationships.

Humans were not created in the image of dogs or trees, but in the image of God. People participate with God in ruling over the world, creating new life, preserving life, and so on. God is the one who “heals all [our] disease” (Psalm 103:3), yet He often does so through human physicians and through drugs that scientists have discovered or invented.

There is simply no theological warrant for the comment attributed to skeptics of a previous era: “If God had wanted people to fly, He would have created them with wings.” One might as well say, “If God had wanted people to eat, He would have created them with attached food dispensers” or “If God had wanted people to speak English, He would have created them with an innate knowledge of English.” Such silliness assumes that anything that is God’s will is always accomplished without any effort on the part of people. On the contrary, it is God’s will that we rule over the world, and the hard work that goes into inventing efficient transportation, such as flying, is one aspect of accomplishing that will of God.

Scientists misuse their vocation if they do not participate with God in the work they have been called to do. Since the fall into sin, this work includes efforts to ameliorate the effects of sin, such as healing diseases, increasing fertility (both of the ground and people), and reducing pain. Scientific discoveries and inventions that aid in such work are blessings that God gives us through scientists.

Christian educators misuse their vocation when they fail to properly value, encourage, and delight in each student in their classroom. Contaminated by sin, teaching and learning have never been easy. Still, by God’s grace, each new lesson can be as fresh, invigorating, and rewarding as the creative energy God gives the instructor and the knowledge embraced by enlightened young minds. Christian educators are entrusted with great treasures: children received from the creative hand of God, the wisdom of the ages handed down for us to share with them, and understandings established and rooted in God’s Word.

In Search of the Path between Heaven and Earth

The scientist and the educator struggle to follow the path to which they have been called, a path between heaven and Earth. It is a struggle with twin dangers: that of flying too high or of not flying at all. In his *Metamorphoses*, Ovid immortalized this struggle through his retelling of the ancient Greek myth of Daedalus and Icarus:

Meanwhile Daedalus, tired of Crete and of his long absence from home, was filled with longing for his own country, but he was shut in by the sea. Then he said: “The king may block my way by land or across the ocean, but the sky, surely, is open, and that is how we shall go. Minos may possess all the rest, but he does not possess the air.” With these words, he set his mind to sciences never explored before, and altered the laws of nature. . . . [He built wings of feathers and string and wax and was able to raise himself into the air.] Then he prepared his son to fly too. “I warn you, Icarus,” he said, “you must follow a course midway between earth and heaven, in case the sun should scorch your feathers, if you go too high, or the water make them heavy if you are too low. . . . Take me as your guide, and follow me!” . . . [As they began their flight together, a fisherman] caught sight of them as they flew past and stood stock still in astonishment, believing that these creatures who could fly through the air must be gods. . . . [Part way through the journey,] Icarus began to enjoy the thrill of swooping boldly through the air. Drawn on by his eagerness for the open sky, he left his guide and soared upwards, till he came too close to the blazing sun, and it softened the sweet-smelling wax that bound his wings together. The wax melted. Icarus moved his bare arms up and down, but without their feathers they had no purchase on the air. . . . [When Icarus fell into the ocean,] the unhappy father, a father no longer, cried out: “Icarus!” . . . As he was still calling “Icarus” he saw the feather on