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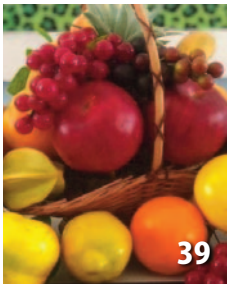

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Faith-Ann A. McGarrell

What Makes the Difference?

I was recently reminded of Parker Palmer's well-known quotation, "We teach who we are,"[1] and I paused to ask myself, "Who am I, really, as an Adventist educator? What makes me different or unique from others engaged in this noble profession?" I think we should all ask ourselves these questions regularly. The answers can radically shift our perspective and keep us focused on *why* we do what we do.

On the surface, educators share similar passions. Most are excited about their specific content areas, feel the thrill of satisfaction after mastering various instructional techniques, and experience "ah ha" moments when an assessment approach works well and reveals some eye-opening insight. We love our students; they energize and challenge us. We share in their delight as their eyes light up in discovery. Their desire to learn about themselves, their communities, and their place in this world feeds our purpose.

However, as Adventist educators, we must see our roles, whether teaching or serving as educational administrators, as more than a profession or a job. The call to the education ministry is sacred (Ephesians 4:11-16). And responding to that invitation demands a commitment to the One who calls. In addition to the recurring tasks of planning lessons, grading papers, supervising students, working with our fellow educators, partnering with parents and church members, maintaining certifications, pursuing professional development, and interacting with our local communities, we have a spiritual calling that wholly depends on our personal relationship with Jesus Christ.

Called to Reflect Christ

We are called to reflect Christ's character, which requires spending time in God's presence. Time in Christ's presence—reading the Word, conversing in prayer, interacting with others, and spending time in nature observing His handiwork—helps smooth our rough edges. Daily, we recognize our need for God and appreciate the gifts of His compassion, grace, and mercy; we learn the importance of humble service and seek after that which is pure and noble (Philippians 4:8). We strive to be peacemakers in a world charged with conflict and energized by discontent (Matthew 5:3-10). 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).[2] Matthew also records Christ's words, which reflect what happens when we follow Him: "'You are the light of the world . . . let your light shine before others, that they may see your good deeds and glorify your Father in heaven'" (Matthew 5:14-16). An interesting thing about light: The best surfaces for pure reflection are smooth—glass, mirrors, or polished metals.[3] Like Job, we can trust that all we learn in our relationship with God will polish and refine our characters like pure gold (Job 23:10). A personal relationship with Christ changes who we are! It revolutionizes our worldview and reshapes our understanding of our purpose.

Called to Point Others to Jesus

Just as Christ desires the best and highest for us, as Adventist educators, we must desire the same for our students, colleagues, and those with whom we interact. To achieve this, we must embrace our personal responsibility to keep our daily connection with Christ strong, pursuing it with the same level of intentionality put into maintaining certificates, degrees, licenses, or other aspects of professional growth. All are essential as we fulfill our responsibilities to those students in our care and others we encounter. This level of conscious, intentional interaction is no easy task. Ellen White, reflecting on what it takes to maintain this level of commitment to the profession, wrote, "[Teachers] will spare no pains to reach the highest standard of excellence. All that they desire their students to become, they will themselves strive

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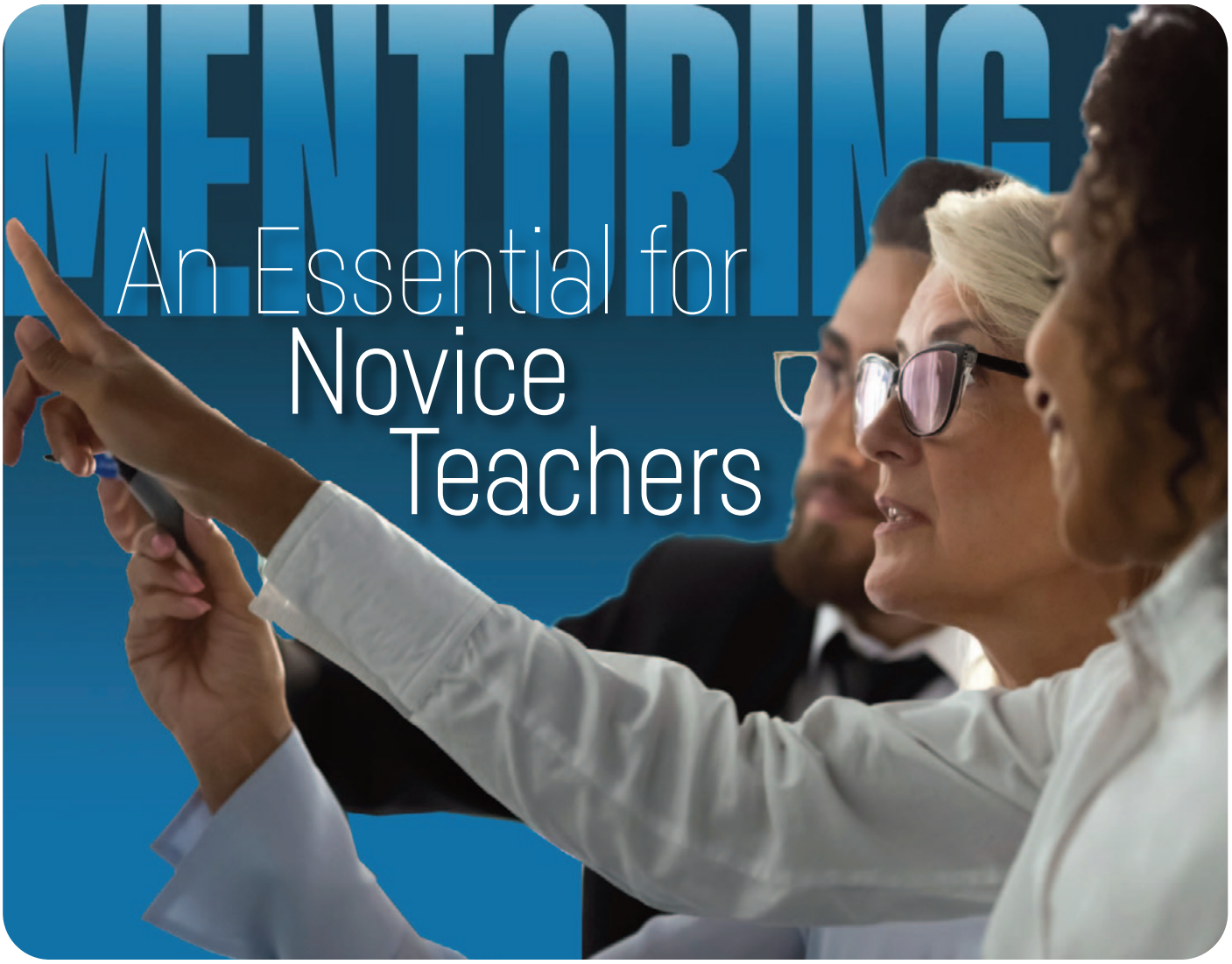

An Essential for Novice Teachers

"You will not fail here; we won't let you!" said the lead teacher for our 1st-grade team of five teachers at a K-5 public school. I (K.F.) had taught for 11 years in Seventh-day Adventist schools before moving to this Tennessee public school but was usually the only teacher at my grade level. This public school followed the Professional Learning Communities (PLCs) format[1]; teachers at the same grade level met weekly to share lesson ideas to support struggling students. I was assigned a mentor for my first three years. Then I became a mentor for a new teacher. This program was for first-year teachers and teachers new to the district.

Providing scaffolding for novice teachers is essential.[2] When I taught in Adventist schools, I never had a formal mentor. Yet, I experienced the benefit of having support from other professionals, and with a God-given passion for teaching, I grew daily in my profession. However, many novice teachers with the same God-given passion do not have the essential support needed to thrive, and some leave their schools or even the teaching profession after a few years. Would support have helped them stay?

Teacher Attrition Is a Problem

Teacher turnover is a growing problem. As veteran teachers retire, more young, inexperienced teachers replace them.[3] Teachers, especially novice teachers, can become overwhelmed with workload responsibilities, classroom management, interactions with parents, constituents, administrators, and high levels of stress.[4] Teacher turnover can harm student achievement and has a high financial cost.[5] Also, fewer applicants are entering the profession. Between the 2008-2009 and the 2016-2017 school year, universities in the U. S. reported a 27.4 percent drop in teachers completing

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teacher-education programs.[6]

It is essential to retain qualified teachers. The United States Department of Education (DOE) studies indicate that, throughout the U.S., roughly 17 percent of new teachers leave the profession within the first five years.[7] Earlier research suggested that at least a third[8] and, in some cases, as many as 40 to 50 percent of U.S. teachers leave in the first five years.[9] Research regarding Adventist teachers' retention rates is limited.

Is Mentoring a Solution?

Mentoring and other supports, such as a reduced teaching load and structured reflection opportunities, can increase retention in the profession.[10] Increased support in Finland, Singapore, Canada, and Australia improved retention rates. For example, in a report published five years ago, the Toronto [Canada] school district reported that it was annually retaining 98 percent of its first-year teachers).[11] Many U.S. school districts have developed teacher-induction programs to familiarize novices with school culture and norms. Mentoring helps new teachers develop essential skills and confidence and is most effective when it utilizes multiple approaches.[12]

From 1988 through 2009, the National Center for Education Statistics within the U.S. DOE surveyed teachers from the 50 states and the District of Columbia. The Schools and Staffing Survey (SASS) and the Teacher Follow-up Survey (TFS) indicated that a greater percentage of private school teachers left teaching than public school teachers.[13]

Seventh-day Adventist Education

Adventist education differs in many ways from public education. Although both systems prepare students for work within society, Adventist education, like most forms of Christian education, focuses on preparing students for this life and for eternity,[14] and encouraging students to commit their lives to Jesus Christ. Adventist education occurs in a nurturing, Christian environment encompassing mental, physical, and spiritual growth.[15] Social-emotional learning is another area to be included in a well-rounded education.[16]

Public school teachers have extracurricular responsibilities, such as bus duty or school leadership committees. The Adventist teacher's responsibilities can be even more encompassing, such as cleaning the school bathrooms, painting the school's exterior, and participating in church activities! Additionally, small school sizes can mean lots of work for each teacher. Many schools in the Adventist Church's North American Division (NAD) have three or fewer teachers (55 percent). In the 2021-2022 school year, the NAD had 161 PreK-12 schools with one teacher, 144 schools with two, 95 schools with three, and 332 schools with four or more teachers. The 9,966 full-time teachers and administrators are employed in elementary, secondary, university, and early-childhood positions. Some administrators are teaching principals. In 2021, NAD schools served more than 74,000 students.[17] Adventist teachers, particularly if they have little support and heavy workloads, can quickly "burn out," potentially exiting the teaching profession.

Research on Seventh-day Adventist teacher commitment and mentoring is limited. In a study conducted more than 20 years ago in the Lake Union Conference of NAD, male teacher commitment was correlated with job satisfaction; commitment to the church organization was related to female job satisfaction.[18] In 1999, McCune published results of a small survey of Adventist novice teachers in California indicating that 43 percent felt they received unsatisfactory support. Many of these teachers desired mentors.[19] The most comprehensive study, however, began in 1987 and continued every two years until 2007. This study, known as the Profile Study, surveyed Adventist educators and was conducted in Bermuda, Canada, and the United States. According to Profile 2004 (and later, Profile 2007), most Adventist K-12 teachers in the NAD were highly educated, certified, and committed to teaching in Adventist schools.[20] Analysis of the Profile 2007 study showed that more than 92 percent of the teachers indicated a desire to remain in Adventist schools for the next three years. Teachers were slightly more committed to the Adventist system than to their current school. These results indicated a committed K-12 workforce in the NAD.[21]

A more recent report showed a loss of about one percent per year of Adventist teachers from Adventist schools worldwide or roughly 1,000 teachers annually.[22] About 30 percent of the Adventist teachers worldwide who left were replaced with non-Adventist teachers, which is concerning for a mission-minded church. Although teachers leave for various reasons, it is crucial to examine whether support encourages teachers to stay.

In 2014, the NAD Education Taskforce (NADET) assessed various issues in Adventist education. Recommendations included improving professional-development opportunities and support, especially for teachers at small schools, teaching principals, and boarding academy principals.[23] Studies of public schools have shown that mentoring and other supports can raise teacher self-efficacy and retention).[24] Novice teachers especially need support.[25]

Can Support Raise Adventist Teacher Retention Levels?

My research (K.F.) examined the influence of mentoring, teacher self-efficacy (confidence in teaching ability), and perceptions of organizational support on Seventh-day Adventist novice teacher commitment to the teaching profession in the North American Division. Characteristics of effective mentors and mentoring programs were identified, and novices' mentoring experiences, as well as comparisons of novice and mentor expectations, were recorded using quan-

titative surveys, qualitative interviews, observations, and artifact collection.

The population for my study was novice teachers in areas of the eight union conferences of the NAD located within the continental United States. I obtained Institutional Review Board approval from Andrews University (Berrien Springs, Michigan, U.S.A.) and permission from the NAD Office of Education. Then, I contacted individual conferences and asked them to identify novice and mentor teachers in their territories so that I could interview them for the study.

I (K.F.) used the Novice Teacher Efficacy, Support, and Mentoring Survey to collect responses from beginning Adventist teachers (0-5 years experience). The Mentoring Survey collected responses from teachers who were currently or had recently been mentors. Both surveys asked about years in teaching, grades taught, gender, age, school size, and location. Novices reflected on their commitment to the teaching profession, self-efficacy, and perceptions of organizational support. They reported whether they had an assigned mentor, an informal mentor, or no mentor. Both novices and mentors identified qualities they considered necessary for a mentor teacher and a mentoring program to possess. Teachers were surveyed during the 2019-2020 school year. Interviews, observations, and artifact collection occurred in the 2019-2020 and the 2020-2021 school years (affected somewhat by quarantines).

Practical Ways Schools Can Support Novice Teachers

New teacher induction: Veteran teachers and administrators must familiarize novices with important school policies and procedures. We recommend a combination of face-to-face experiences to build community as well as virtual experiences to add flexibility to the new teachers' schedules.

Mentor program: Novice teachers can be paired with veteran teachers, retired teachers, conference personnel, a conference coach, other educators in the community, or virtual mentors. Novice teachers should decide the agenda for the meetings. Novel ways to increase mentors' and mentees' bandwidths are to do walking meetings (meetings that take place during a walk rather than in a conference room) or have a professional learning hour where all teachers engage in some form of professional development according to their individualized growth plans.

Administrative support: Administrators can provide tips, encouragement, and feedback from formal or informal teacher evaluations. Principals should maintain communication, check in with novices periodically, and offer to help in the classroom as needed, such as reading during story time or watching the teacher's class during lunch or recess.

Planning time/P.L.C.s: Novice teachers should have a planning time built into the day or week. If creative scheduling allows each teacher at least one class period per week to use for lesson planning, grading, or meeting with a Professional Learning Community[26] such as teachers at similar grade levels, this could increase efficacy and lower stress levels.

Reduced teaching load: Creative planning could allow a novice one afternoon a month to meet with a mentor, observe a veteran teacher, or reflect and plan for the coming week.

Online supports: Curriculum and Instruction Resource Center Linking Educators (http://circle.adventist.org) is an Adventist online support providing resources to teachers. *The Journal of Adventist Education's searchable database* (http://jae.adventist.org and on the app) is also a resource, as is its companion resource Adventist Educators Blog (https://adventisteducators.org/).

Growth mindset: Carol Dweck[27] noted that viewing mistakes as opportunities for growth, rather than failures, allows for learning. This mindset can help novice teachers. Principals can encourage novices to learn from mistakes, set goals, and reflect on practices rather than becoming discouraged by setbacks.

Data Analysis

Next, quantitative data analysis (frequency distributions, means, standard deviations, percentages, Pearson's correlations, Cronbach's alpha, and hierarchical linear regression) was conducted. Qualitative analysis (coding) analyzed responses to interviews, observations, and artifact collection (mentor handbooks, checklists, and coach and mentor job descriptions). Member checking of participants (returning responses to respondents so they can validate them) helped ensure accuracy and preserved intended meanings.

The researcher observed micro- and macro-mentoring sessions (K.F.). I defined micro-mentoring as a mentor-novice partnership (a mentor assigned to one or two novices). Macro-mentoring referred to an instructional coach for the school or conference who assisted multiple teachers. Informal mentoring was defined as assistance provided by colleagues, principals, or friends (not assigned mentors).

Results

Fifty-four novice teachers responded from 21 NAD conferences: Arkansas/Louisiana, Chesapeake, Florida, Hawaii, Idaho, Illinois, Indiana, Iowa-Missouri, Michigan, Montana, New Jersey, Oregon, Pennsylvania, Rocky Mountain, South Atlantic, South Central, Southeastern California, Texico, Upper Columbia, Washington, and Wisconsin. Eighty-three percent of the respondents were fe-

male, under 30 years old (61.1 percent), and held bachelors' degrees (79 percent). Seventy-four percent had three or fewer years of experience. Novice teachers were from small (1-3 teachers), medium (4-10), and large (11 or more) Adventist schools across the NAD (K-8, K-10, academies). Most teachers had between 11 and 20 students (52 percent) but taught in schools with student populations of 110 or fewer. Roughly 26 percent were teaching in rural settings.

Mentor teachers represented 14 NAD conferences: Arkansas-Louisiana, Chesapeake, Florida, Idaho, Indiana, Iowa-Missouri, Michigan, New Jersey, Ohio, Oregon, Pennsylvania, South Central, Upper Columbia, and Washington. Thirty of the 34 mentors were female, and more than half were between 40-59 years old (56 percent). Student populations in their schools ranged from 11 to 680 students. More than half of the mentors worked in schools with fewer than 100 students.

Novice teachers had moderate commitment levels to the teaching profession; levels of self-efficacy and perceptions of administrative support were also moderate. Self-efficacy encompassed three aspects: implementational (leadership skills), instructional, and relationship. All three self-efficacy aspects were at moderate levels. In this study, mentoring had no statistically significant effect on teacher commitment to the profession. Hierarchical linear regression indicated that teacher mentoring, self-efficacy, and perceived organizational support explained about 38 percent of the variance in teacher commitment to the profession. However, only administrative support and relationship self-efficacy were significant predictors.

Roughly 80 percent of the novice teachers had received some mentoring during their first year or during the survey period. Some had assigned mentors, while others benefitted from conference instructional coaches. Colleagues and principals provided some informal mentoring. Roughly 20 percent of the novices had never experienced mentor support.

Ten novice and 12 mentor teachers were interviewed. These interviews included representatives from the macro-mentoring, micro-mentoring, informal, and no-mentoring groups. Most of the interviews and observations were recorded via Zoom; a few were phone interviews. Observations were conducted in both micro- and macro-mentoring sessions.

Novice teachers lacking support wanted mentors. One teacher indicated that lack of support coupled with the volume of work was "not sustainable over time" and could force her to leave the teaching profession, despite a love for kids and teaching. Teachers with mentors were grateful for the support. Mentors interviewed were dedicated to helping novice teachers.

Both groups felt mentors should provide emotional support, have teaching qualifications, and possess *coaching skills. Emotional support* included listening and encouragement.

Ideas for Principals and Conference Personnel

Collection of program/process data: Student demographic and achievement data are collected throughout the North American Division (and other divisions, as well). To determine effectiveness of mentoring and coaching programs, collection of data regarding mentor programs and processes should be encouraged. This can be used to inform future plans and will assist in supporting novice teachers and in strengthening existing programs.

Explore coaching models: Several models have been used for coaching novices. One helpful model described in the literature is Professional Learning Communities (P.L.C.s). P.L.C.s provide assistance in a group setting.[28] In my case (K.F.), my grade-level team met once a week during a planning time while students in the entire grade level were in special-area classes (art, music, physical education, library/counseling). This grade-level support was invaluable as I (K.F.) assimilated into the public school environment. Research on the coaching relationship is outlined in Lipton and Wellman.[29] Research by DuFour[30] about Professional Learning Communities and Knight's *Impact Learning* coaching model[31] can provide tips to help Adventist principals and conferences set up P.L.C.s as well and to adapt coaching methods to work for church schools.

Adapt chosen model to Adventist schools: Because many Adventist schools are small, teachers may not be part of a P.L.C. It is imperative that a novice teacher have access to coaches, even if in non-traditional ways. For example, a teacher in a two-teacher school may be coached by the other teacher in this dyad; a teacher in a one-teacher school (though not an advisable setting for a first-year teacher) might have access to a veteran teacher via Zoom. The conference education superintendent could recommend a veteran teacher to serve as one. Some schools even utilize teacher study groups that meet once a week via Zoom or another platform (see http://circle.adventist.org/files/jae/en/jae199658032405.pdf for additional ideas). Novice teachers must be provided with resources and can have weekly check-ins with a veteran teacher, even over geographic distances.

Encourage Reflection: Before the school year begins, novice teachers can be provided with orientation meetings. During those meetings, novice teachers can be encouraged to embrace a growth mindset and to reflect on their practices. During the school year, they can take an active role to seek out help from another teacher or conference personnel. While it is important to provide support for novices, it is also important for novices to adopt active roles in reaching out for help as needed.

A study by Strauss et al. found that teachers desired support and a mentoring relationship that involved good communication.[32] Previous literature confirmed the importance of *teacher qualifications*, including mentor training and *coaching skills*.[33]

Novice teacher qualitative themes included: *commitment to student success, sense of mission, inconsistent support, appreciation of support,* and *growing professionally over time.* These themes corroborated the perspective that Adventist teachers have a sense of mission,[34] and want to lead students to Jesus,[35] but may experience *inconsistent support*.[36] Prior research by Thayer et al. confirmed the need to support novice teachers and provide professional development.[37]

Mentors' themes included: *A passion for novice success* and *reciprocal learning and growth*. Mentors noted that *accountability* is crucial for effective mentor programs. Research has revealed that mentor programs need structure and accountability.[38] In this study, there was inconsistency regarding mentor programs; Some novice teachers enjoyed structured mentoring and coaching, some had informal mentors, but others had no support.[39]

For many participants in my (K.F.) study, a structured program included a formally assigned mentor for each novice teacher. Mentors met regularly with novices. For others, the local conferences provided an instructional coach (or coaches) to assist novices as needed. Many programs also included induction at the beginning of the school year. Whatever method is used, a structured program should offer support, with accountability to the conference for program success.

Of the mentor teachers interviewed, none received remuneration for their time. Mentors were driven by a desire to see novices succeed and felt it a privilege to share ideas and methods gleaned from years of experience. When I taught in the public school system, the only mentors who were compensated were the leaders of the mentoring program at the school level.

Conclusions and Recommendations

With fewer than 100 participants, it is difficult to draw conclusions for all novice teachers in the North American Division or the world. Although self-efficacy and administrative support were significant predictors of commitment to the profession, mentoring as a single variable had no significant effect on teacher commitment. However, as each support variable was added to the equation, the importance of mentoring increased. Mentoring could become statistically significant with a larger sample size and adding other support variables. This conclusion is consistent with Ingersoll.[40] Novices who receive an array of supports, such as mentoring, administrative support, planning time, and reduced teaching load, tend to have higher levels of commitment to the profession.

The findings indicated that novice Adventist teachers who feel supported and have high self-efficacy are more likely to remain committed to the teaching profession. Several models were observed in NAD K-12 schools: micro-mentoring, macro-mentoring, and informal support. Currently, inconsistent levels of support exist for novice teachers across the NAD structure, and accountability at the school or conference level is needed. More research needs to be conducted to examine methods that work well in the Adventist school environment. Conferences and principals must find ways to improve support for novice Adventist teachers.[41]

This article has been peer reviewed.

Kathleen Forbis, PhD, *is currently a contract instructor and student teacher supervisor for Walla Walla University, School of Education and Psychology in College Place, Washington, U.S.A. Dr. Forbis earned her doctorate in curriculum and instruction from Andrews University (Berrien Springs, Michigan, U.S.A.). She also has a Master's degree in education with an emphasis in reading and a bachelor's degree in social work from Pacific Union College (Angwin, California, U.S.A.). She has taught in the lower elementary grades (Adventist and public school), homeschooled, and taught in children's Sabbath schools. She is passionate about mentoring teachers and providing quality education for all.*

Anneris Coria-Navia, EdD, *is Associate Provost and Director of the Center for Teaching and Learning at Andrews University. Dr. Coria-Navia studies K-12 Seventh-day Adventist schools, professional development, and effective teaching. As director of the Center for Teaching and Learning, she led the development of the university's mentoring program.*

Jimmy Kijai, PhD, *is Emeritus Professor of Research and Statistical Methodology at Andrews University. He continues to teach graduate-level courses in research methods and applied statistics for Adventist universities in the Philippines, Thailand, Zambia, and the Caribbean. He currently resides in Berrien Springs, Michigan, U.S.A.*

Larry D. Burton, PhD, *is Emeritus Professor of Teacher Education at Andrews University. He is semi-retired, although he continues to serve as Editor of the* Journal of Research on Christian Education. *Dr. Burton also serves on MA and PhD research committees for the College of Education and International Services as needed. He currently resides in Berrien Springs, Michigan, U.S.A.*

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Creating and Implementing a Spiritual Master Plan

We were interacting with a group of students. It was part of a visit to the institution where they were enrolled, and we wanted a sense of what they thought of the spiritual-life experiences at the school. "It's pretty standard, I guess," one of the students began. "We have Bible classes and a chapel period each week, but the chapel is mostly announcements. Sometimes, though, they will have a good speaker. But it seems random." "Mostly, it's pretty boring," another student said. "Even the teachers in the [religion] classes rarely talk about things that matter to us."

"Do you feel that spiritual matters are important in your life?" we asked. Students nodded. "What do you think could be done to make the spiritual experience here more relevant and meaningful?"

The group came alive. They talked about the need for a spiritual community, safe places to share their questions, caring people who would encourage them and pray with them, and messages that would connect the Bible with situations and decisions they faced. They reflected on prior faith-building experiences in their lives—a small-group fellowship, service activities, a weekend retreat, an agape supper—and talked about how they wished these could be re-created at the school.

Later we sat with the chaplain. "Yes, we have a spiritual master plan. That is one of my summer projects, to have it ready for the new year." We asked about what served as input or feedback. "Well, I watch how things went the previous year. And take my cue as to what I should change." We asked whether the institution made a

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budgetary provision for the spiritual-life program. "Not exactly," the chaplain replied, "but if we have a special project or program, we can make a request. And sometimes it gets funded."

We talked with the president about the spiritual life at the institution. "We have a good chaplain, and each year I receive a copy of the spiritual master plan." We asked the president what he, as a leader in the school, saw as his role in the spiritual life of the institution. "To hire a good chaplain!"[1]

* * *

Seventh-day Adventist education builds on the premise of whole-person development.[2] An overarching dimension in this process is spiritual nurture and growth. Ellen White, who was instrumental in founding the Adventist educational system, wrote, "The students in our schools and all our youth should be given an education that will strengthen them in the faith."[3]

An essential purpose of Adventist education is that students might experience God's saving grace. Ellen White described this encounter as the redemptive purpose of education.[4] While developing skills and understanding in the disciplines is vital, the redemptive focus prioritizes becoming a disciple of Jesus and then a disciple-maker, extending the kingdom of God through witness and selfless service (Matthew 28:18-20). As Jesus reminds us, "'What do you benefit if you gain the whole world but lose your own soul?'" (Mark 8:36, NLT).[5] "Seek first the kingdom of God and His righteousness, and all these things shall be added to you" (Matthew 6:33, NKJV).[6]

Faith by Design

Faith formation and faith affirmation lie at the heart of Adventist education. To be effective, however, these processes must be intentional. We must nurture faith by design.[7] The intent is that each person who is part of a Seventh-day Adventist school might "grow in the grace and knowledge of our Lord and Savior Jesus Christ" (2 Peter 3:18), experiencing a Bible-based, Christ-centered, Spirit-filled, and kingdom-directed life.

To make intentionality tangible, each educational institution should create and implement a spiritual master plan. This organized and focused approach to nurturing spiritual life is core to the mission and philosophy of Adventist education.[8] To this end, the first element of the Spiritual Development, Service, and Witness area in the Accrediting Association of Seventh-day Adventist Schools, Colleges, and Universities (AAA) Standards highlights the expectation that "The institution has an intentional, coherent, detailed, and current Board-approved spiritual master plan, which serves as the basis for the effective

spiritual development of faculty, staff, and students."[9]

Recently, the authors of this article had the opportunity to lead a well-qualified and committed taskforce in developing an updated guide for creating and implementing a spiritual master plan at Adventist colleges and universities, with applications to primary schools. This guide, *Faith by Design*, incorporates the contributions and feedback of experienced chaplains, administrators, and educational leaders from around the world. The document, available online,[10] is organized into three sections: (1) The Essentials—for those who are already experienced as a chaplain or spiritual-life director or vice-president at an Adventist school, college, or university; (2) The Details—for those who may be new to their roles or who would like to delve more deeply into the process; and (3) The Materials—A wealth of templates, instruments, and other resources for those who seek to nurture faith.

In the following sections of this article, we will share some of the expertise and wisdom of those who participated in developing *Faith by Design*, to whom we are indebted,[11] as well as a few insights from our own experience as we have partnered with educational institutions to promote spiritual development and strengthen faith.

Potential Pitfalls

As we reviewed our collective experience, we realized that there are potential hazards that can hamper the achievement of vibrant spiritual life at an Adventist college, university, or secondary school. These perspectives or situations often limit the effectiveness of our efforts to develop and strengthen faith.

For example, spiritual-life plans that achieve only limited effectiveness tend to have been created in a vacuum, without broad consultation with stakeholders (e.g., alumni, church members and leaders, parents, and the wider community). These plans often focus almost exclusively on students, without regard to the spiritual nurture of faculty and support staff, who serve as models and mentors to students in their faith journey. And when focusing on students, the spiritual activities and initiatives tend to cater solely to residential students, without considering the spiritual nurture of off-campus or online students.

In these institutions, a belief often pervades the campus that caring for the spiritual life of the institution is a task reserved for chaplains or pastors. The chaplains and pastors themselves often seem to believe that the spiritual-life program is defined primarily by the religion courses and the main religious events, whether organized by the institution or the campus/sponsoring church or that a mere collection of spiritual activities, without an integrating purpose, will create a spiritual environment and affirm faith.

The spiritual-life program of a college, university, or school is viewed as the *very reason* for its existence, not merely as a service to the institution or an added benefit of Adventist education.

Spiritual master plans that tend to fall short do not specify who is responsible for a given initiative, when it will take place, or what resources will be required. Consequently, the initiative rarely transitions from concept to reality. And because a formal annual budget is not developed, the administration allocates little or no funding for the spiritual-life program of the institution while still expecting the institution to be effective in nurturing faith and promoting spiritual development. Many spiritual master plans and initiatives do not undergo rigorous formal evaluations, with administrators relying on anecdotes as the basis for review and revision. In some cases, there is not even a yearly update of the plan, with essentially the same spiritual program implemented year after year.

Another shortcoming concerns the matter of the campus church at a boarding institution. Often a campus church pastor is chosen through an appointment process that excludes institutional participation. As a result, the program of the campus church tends to focus primarily on meeting the expectations of those who attend from the surrounding community while disregarding the needs of the institutional family—and especially students—as its core mission.

Pitfalls such as these compromise the spiritual life of an institution.

Best Practices

We, as a team (the authors and those who participated in developing *Faith by Design*), endeavored to distill the most effective practices that nurture spiritual life in Adventist educational institutions. Here is a short list of these practices:

1. The spiritual-life program of a college, university, or school is viewed as the *very reason* for its existence, not merely as a service to the institution or an added benefit of Adventist education.

2. The spiritual-life program of the institution must *closely align* with the institution's philosophy, mission, and values and with the mission, beliefs, and priorities of the Seventh-day Adventist Church.

3. The spiritual master plan must be a *core component* of the institution's strategic plan, occupying a place of priority and interfacing with the institution's academic, financial,

human resources, and facilities master plans (see Figure 1).

4. The president/principal is the *spiritual leader* of the institution. This role may be shared with, but not delegated to, the church pastor, chaplain, Bible teacher, or others involved in the spiritual-life program of the institution.

5. The person who oversees the implementation of the spiritual-life program of the institution *reports directly* to the president/principal of the institution.

6. The various *stakeholders*, such as faculty, support staff, and especially students, should participate in developing, implementing, and updating the spiritual master plan.

7.The spiritual-life program must be *comprehensive*, encompassing the various student categories (including non-residential and online students), as well as administrators, faculty, and non-teaching staff.

8. The *church* at a boarding academy, college, or university serves, first and foremost, those who comprise the institutional family, including students, administrators, faculty, and support staff.

9. Adequate *resources* for the spiritual-life program of the institution must be provided by the administration, commensurate with the priority of spiritual nurture and faith development in the life of the institution.

10. The spiritual-life program must be *intentional*, carefully planned, and executed in such a way that will accomplish its anticipated outcomes.

11. The spiritual-life program should be *dynamic*, periodically assessed, and updated to adequately reflect the spiritual needs and aspirations of the institutional family.

These practices, in turn, can serve as guiding principles in developing and implementing the spiritual-life program, steering the process through its key phases.

Four Phases

In our reviews of successful spiritual-life programs, there seem to be four crucial phases that occur. These stages—*Prepare, Develop, Implement*, and *Evaluate*—correspond to the questions: Who are we? Where are we going? How will we get there? What impact did we make?

Figure 1. The Place of the Spiritual Life Master Plan in the Strategic Plan of an Institution

The first phase, **Prepare**, includes two steps: *Organize* and *Appraise*. In the *Organization* step, a standing spiritual-life committee is set up, comprised of persons who represent significant groups within the institution, including students. The committee is chaired by the president/principal as the spiritual leader of the institution, with the head chaplain or Bible teacher often serving as secretary. The core functions of this committee are to prepare the spiritual master plan and provide guidance regarding its implementation and evaluation.

Appraisal is the second step. Here the spiritual-life committee commissions and receives relevant data that provide a diagnostic profile of the spiritual life of the institution. This appraisal seeks to identify what is working well, what needs to be adjusted, and what needs to be added or dropped. This diagnosis should involve consultation with all stakeholder groups.

The second phase, **Develop**, also involves two steps: the development of *Goals* and the creation of *Action Plans*. In terms of *Goals*, the intended outcomes of the spiritual-life program should align with the institution's mission and strategic priorities while considering student and employee demographics. These outcomes might include the following:

- Personal perception of a more *vibrant relationship* with Jesus Christ and *faith development* through their experience at the institution.
- *Expressed commitment* to Christ and the divine plan for life and learning through a growing understanding of the dimensions and implications of a *biblical worldview*.
- Increased understanding, acceptance, and practice of the *teachings of the Bible*, including the manner these are conveyed through the *mission, beliefs,* and *practices* of the Seventh-day Adventist Church.
- Involvement in personal and corporate faith-building practices, including *prayer*, *Bible study*, and *worship*.
- Expressed commitment to and engagement in *service* and *witness*, seeking to make a positive difference in the world for God.

Goals can also feature specific be-

Figure 2. Spiritual Master Plan Checklist

Does the spiritual master plan . . .

- Delineate those who were involved in its development and the process followed?
- Describe the diagnostic-assessment results that factored into the development of the plan?
- Explicitly state desired outcomes, inclusive of students, faculty, and support staff?
- Indicate who is responsible for the general administration of the plan?
- Identify specific action plans for achieving each of its goals?
- Specify where an action plan will take place and who is responsible?
- Specify the resources (human, financial) that will be required for each initiative?
- Contain a timeline for implementation of each action plan?
- Describe how each initiative will be communicated to the target group(s)?
- Present an overall budget that will be needed for implementation?
- Use a variety of methods to evaluate the goals?
- Explain how evaluation data will be used to bring about needed change?
- Identify means whereby the spiritual master plan will be broadly communicated?

liefs, values, and principles based on the needs assessment.[12] It can be helpful to develop a conceptual framework. For example, one institution used the framework: *Know Christ. Grow in Christ. Serve with Christ.* While another institution fits its spiritual master plan within the framework: *Belong. Believe. Become.*[13]

In creating action plans, we delineate how, when, and in what venues it is anticipated that spiritual changes will occur in the lives of students and employees. We also specify who is responsible for each initiative and give an estimate of the resources required. Finally, we identify indicators of how the initiative's success will be determined. Together, the goals and action plans constitute the heart of the spiritual master plan (see Figure 2 for a checklist of key ingredients).

The third phase, **Implement**, incorporates two key elements: involvement of the *Whole Institutional Family* and the process of *Formative Evaluation*. Some spiritual master plans focus almost exclusively on students. While students are certainly a key focus, it is equally essential to implement initiatives for faculty and support staff successfully. When the spiritual experience of employees is nurtured, they can more effectively influence students' faith.

Formative evaluation is a core component of implementation and involves feedback loops and mid-course adjustments. Feedback loops provide data early in the process regarding what is working well and what needs to be adjusted. That data, whether obtained through brief surveys or small-group interviews or based on other metrics such as participation rates, can inform mid-course decisions that need to be made. The bottom line is that we do not want to wait until the end of a school year to discover that a particular initiative is faltering when with a mid-course adjustment, it might have resulted in optimal effects.

The final phase, **Evaluate**, involves a *Summative Evaluation* and an *Annual Report*. A comprehensive year-end evaluation of the spiritual-life program includes formal assessments completed by students, faculty, and staff. These need to be designed with sufficient specificity to assess progress toward the goals of the spiritual master plan, as well as the effectiveness of various initiatives (see Figure 3 for potential evaluation strategies).

Based on the year-end evaluation, an annual report is prepared that documents the efficacy of the spiritual-life program of the institution. This report is presented, first to the spiritual-life steering committee, then to the full administration, and to the board of trustees/school board, with highlights

Figure 3. Potential Evaluation Strategies

☐ End-of-year surveys on spiritual life.

☐ Exit interviews with students.

☐ Attitude surveys on matters of faith, spiritual practices, lifestyle issues, and spiritual development, taken when students enter the institution and when they leave.

☐ Questions in course assessments about faith and spiritual nurture in the classroom.

☐ Asking faculty and staff to include a section on service and faith in annual reports, noting how they perceive that their intentionality influences students.

☐ Surveying alumni on attitudes about faith and the church a few years after graduation.

☐ Identifying means to gauge the involvement of students, faculty, staff, and administration in spiritual activities, such as service, witness, and worship.

Figure 4. Phases in the Spiritual-life Program of a School, College, or University

of that report shared with various constituencies of the institution. This report also serves as a key element in the diagnosis that guides the update of the spiritual master plan for the new school year, thus completing the cycle (see Figure 4).

Concluding Thoughts

Adventist colleges, universities, and schools seek to achieve and maintain high academic standards. These are made tangible by initiating quality academic programs, defining goals and outcomes, designing a relevant and coherent curriculum, and implementing an evaluation system well-aligned to goals and outcomes. It is now the time for Adventist schools to also be intentional in developing the faith of the entire learning community—students, administrators, teachers, and support staff.

Indeed, Jesus promises that when we, as children of God, intentionally prioritize faith development, other essential aspects will follow (Matthew 6:33). As educators, we can claim this promise and be confident that this will result in the harmonious development of each student—academic, physical, socio-emotional, and spiritual dimensions. We reach this goal as Adventist schools prepare, develop, implement, and evaluate a fitting spiritual master plan—faith by design.

Let us revisit the school in the vignette shared at the beginning of this article. Envision us seeing the students' excitement as they tell us of their involvement in developing and implementing the spiritual-life program of the institution. Instead of concerns, they share affirming testimonies of how the spiritual program addresses their interests and needs in meaningful ways.

Envision us listening to the president or principal say, "I chair the monthly meeting of the spiritual-life committee where we keep a close watch on the spiritual heartbeat of the institution." And the chaplain says, "The spiritual master plan permeates all aspects of campus life. It is the catalyst of all activities on our campus." Most of all, we envision hearing the affirmation of faculty, support staff, and students: "Our faith increases!"

This article has been peer reviewed.

Richard A. Sabuin, PhD, *is an Associate Director of the Department of Education at the General Conference of Seventh-day Adventists in Silver Spring, Maryland, U.S.A. He may be contacted at SabuinRi@gc.adventist.org.*

John Wesley Taylor V, PhD, EdD, *is an Associate Director of the Department of Education at the General Conference of Seventh-day Adventists in Silver Spring, Maryland, U.S.A. He may be contacted at taylorjw@gc.adventist.org.*

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NOTES AND REFERENCES

1. These vignettes are derived from a collage of interactions on various college and university campuses.
2. In the leading paragraphs of the book *Education*, Ellen White wrote: "True education is the harmonious development of the physical, mental, and spiritual powers. It prepares the student for the joy of service in this world and for the higher joy of wider service in the world to come" (Mountain View, Calif.: Pacific Press, 1903, 13). Luke 2:52 also describes multifaceted development: "And Jesus grew in wisdom and stature, and in favor with God and man" (Holy Bible, New International Version®, NIV® Copyright © 1973, 1978, 1984, 2011 by Biblica, Inc.® Used by permission. All rights reserved worldwide.)
3. Ellen G. White, Manuscript 106, 1905.
4. _____,"The work of education and the work of redemption are one" (*Education*, 30).

5. New Living Translation, copyright © 1996, 2004, 2007, 2013, 2015 by Tyndale House Foundation. Used by permission of Tyndale House Publishers, Inc., Carol Stream, Illinois 60188. All rights reserved.

6. Unless otherwise indicated, all Scripture passages in this article are quoted from the *New King James Version* of the Bible. Scripture taken from the New King James Version.® Copyright © 1982 by Thomas Nelson, Inc. All rights reserved.

7. Deuteronomy 6:5 to 9 and Psalm 78:5 to 7 indicate that *faith by design* is a divine concept that we are instructed to implement.

8. The General Conference Working Policy (2021), for example, highlights the spiritual master plan as a key expectation for elementary and secondary schools (GCWP A15-25) and for colleges and universities (GCWP A15-30).

9. *Accreditation Handbook* (Silver Spring, Md.: Accrediting Association of Seventh-day Adventist Schools, Colleges and Universities, 2019), III-10, Criteria for Review 2.1. Available at https://adventistaccreditingassociation.org/wp-content/uploads/AAA-Handbook-2019-Complete.pdf.

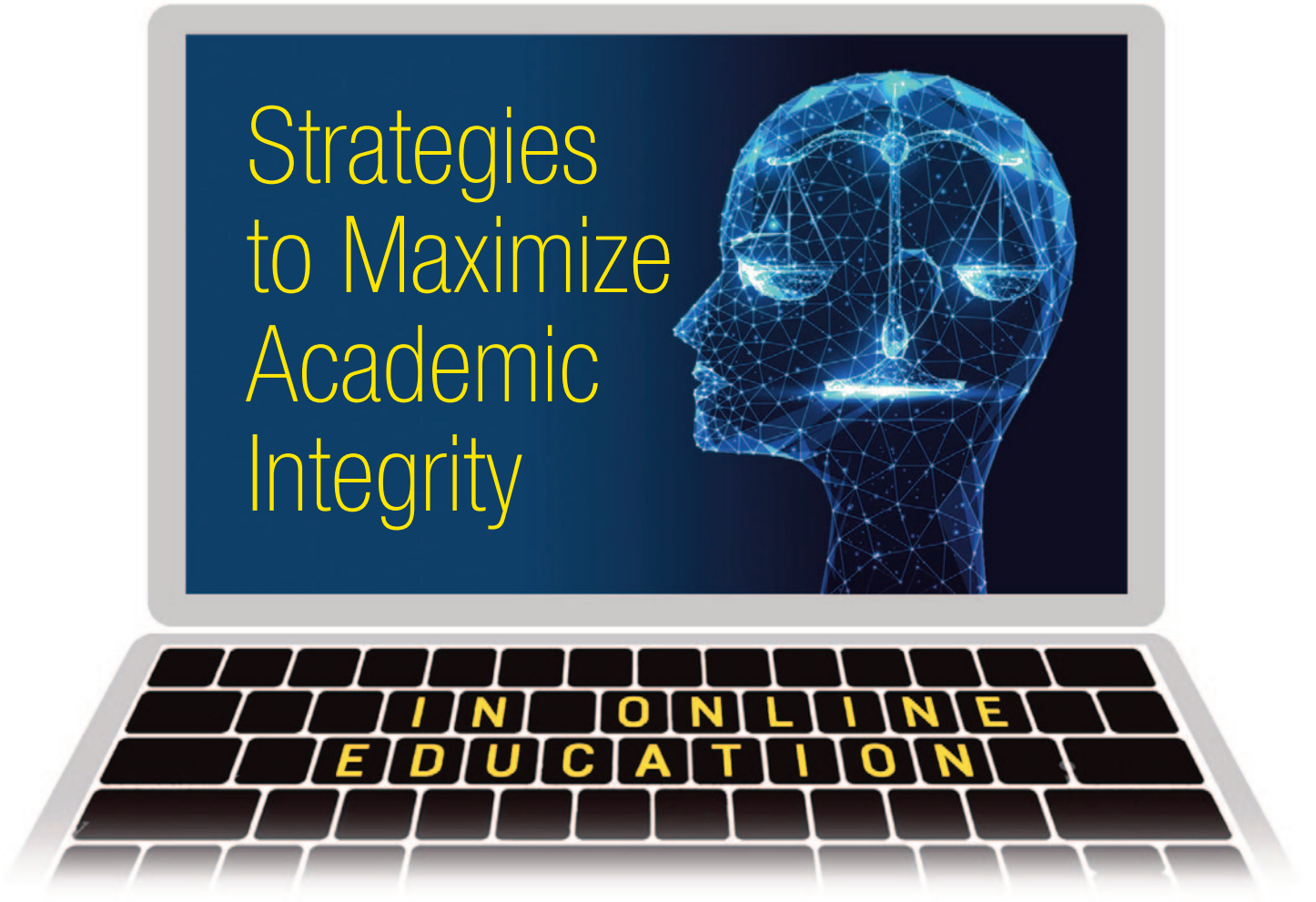
10. See https://www.adventist.education/wp-content/uploads/Spiritual_Master_Plan_Guidebook_2021.pdf. Also available in Spanish at https://www.adventist.education/wp-content/uploads/Plan_Maestro_Desarrollo_Espiritual_Guia_2021.pdf.

11. Special appreciation for the contributions of Stefan Albu, chaplain, Sagunto Adventist College; Juvenal Balisasa, education director, West Central-Africa Division; Gordon Bietz, associate director of education, North America Division; Dilys Brooks, campus chaplain, Loma Linda University; Rich Carlson, vice-president for spiritual life, Union College; Mario Ceballos, director of Adventist Chaplaincy Ministries, General Conference; Gamaliel Florez, education director, Inter-American Division; Prema Gaikwad, professor of education, Adventist International Institute of Advanced Studies; Edgar Luz, education director, South American Division; Daryl Murdoch, national director of Adventist Schools in Australia; Ivan Omaña, assistant director of Adventist Chaplaincy Ministries, North American Division; and Niesha Steinke, chaplain, AdventHealth University; and to all those who provided invaluable feedback.

12. In essence, the goals should be SMART—Simple, Measurable, Attainable, Result-oriented, and Time-focused.

13. Another framework that has been used effectively in Adventist education is ABIDE: Abundant discipling—becoming like Jesus; Bold godliness—growing character and identity; Intentional connecting—building community; Deliberate learning—seeking wisdom with a biblical lens; and Extravagant outreach—sharing Jesus with others. Further detail may be found at https://www.imags.com.au/published/Abide_Master_Plan/20/.

Strategies to Maximize Academic Integrity



When educators transitioned to teaching remotely because of the COVID-19 pandemic, students rapidly gained skills in using Internet-connected devices and learning tools online.[1] While many believed increased access to and exploration of new technology would expand the array of academic-integrity breaches, Peterson's review of numerous studies[2] indicates that cheating may be more prevalent on campus than in online classes. Smaller regional differences than previous literature reported were found through analysis of theses and dissertations from all world regions.[3] Although differences have been found in why and how students cheat, it remains a "pervasive issue"[4] in all education systems and delivery formats. This "damages both the integrity of the perpetrator and assumptions about the quality of education."[5]

An extensive survey of students and teaching staff across eight Australian universities[6] found that students who (1) perceived cheating opportunities existed, (2) faced language-learning challenges, or (3) were dissatisfied with the teaching and learning environment were most at risk for paying someone to do their coursework (i.e., contract cheating). Recognizing that contract cheating[7] is a symptom rather than the problem, this study's recommendations included improving institutional policies and procedures, providing training in teaching practices that build relationships with students, and implementing better curriculum and communication standards.

Notably, the focus was on positive educational change with systems to detect, deter, and manage cheating but not central to maximizing academic integrity. Reflecting on online cheating as many educators pivoted to using digital technology for the first time during the pandemic, Supiano[8] noted that better teaching is more effective than smarter cheating-detection tools.

In this context of increased online education and potentially greater risks of academic dishonesty, this article fo-

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cuses on strategies to maximize academic integrity applicable to online Christian education today. While the authors write from the context of Adventist online higher education, most of the strategies for teaching, learning, and assessment explored in this article are relevant to secondary and tertiary levels of education in both in-person and online settings.[9]

Teaching Integrity

Helping students understand what academic integrity is and why it matters is at the core of developing Christian character and preventing academic dishonesty. Intentionally teaching biblical and ethical principles in every subject, modeling personal integrity (e.g., honesty in the use of images, videos, and sources; being trustworthy, respectful, conscientious, etc.), and living the institutional mission (in and out of the classroom) are foundational to maximizing academic integrity in both teachers and students. Faith-integrating skills, virtues, and mission-aligned values should be articulated as qualities sought in hiring and developed in continuing education for all employees in a Christian education community.

Biblical Foundations to Character and Virtues Education

In Christian education, one starts with the Bible. The Ten Commandments' injunctions against stealing, bearing false witness, and coveting (Exodus 20:15-17) are foundational to character education. Using someone else's work without giving proper credit is stealing and falsifying ownership. One who plagiarizes attempts to claim the credit that rightfully should go to someone else. Teaching students to think through motives for academic dishonesty should include discussion of societal or parental pressure to get good grades, laziness, inadequate planning, a perception that they can get away with it, that "everyone is doing it," and that paying someone else to do their classwork is no different than paying for a carwash or other service.

Much of the discussion in Judaism concerning honesty centered around the concept of respecting the boundary markers of one's neighbors. In the Ancient Near East, territory was defined by stone markers that indicated who owned that space. The Bible condemns the disrespect of such boundary markers. Deuteronomy 27:17 says that one is cursed who moves another's boundary stone; Proverbs 22:28 and 23:10 denounce moving boundary stones. This forbidden removal of boundary stones, known in Hebrew as *hassagat gevul,*[10] is much discussed in the Talmud and later writings. Applied to respecting intellectual boundaries, plagiarizing is like removing someone else's boundary stone. Claiming as one's own intellectual effort what someone else did (whether paid for or stolen) is misrepresenting ownership.

From the Christian perspective of educating for eternity, we recognize that each person is created in the image of God. Each one is broken by sin; thus, students, teachers, and administrators alike fall short of biblical guidelines for a life of integrity, a life that reflects God's character.

From the Christian perspective of educating for eternity, we recognize that each person is created in the image of God. Each one is broken by sin; thus, students, teachers, and administrators alike fall short of biblical guidelines for a life of integrity, a life that reflects God's character. In gratitude for God's solution to sin, Christian educators choose to partner in the work of redemption through modeling and teaching academic integrity.

Addressing contract cheating and how to deter it, Taylor[11] suggested that the ethical behavior of educators, their clear expectations for honesty in learning, and their use of creative learning strategies are three keys to maximizing academic integrity. Christian education should help students internalize the value of integrity in academics and all other spheres of life. Creating a grace community, where employees disciple students, caring as much for their character and virtues development as academic achievement, is equally important in face-to-face and online education.

A redemptive-education approach intentionally and preventatively builds awareness of and inspires commitment to academic integrity. The International Center for Academic Integrity (ICAI)[12] defines *academic integrity* as a commitment to six fundamental values: *honesty, trust, fairness, respect, responsibility,* and *courage*. An academic community of integrity, then "advances the quest for truth and knowledge by requiring intellectual and personal *honesty* in learning, teaching, research, and service (p. 5); fosters a climate of mutual *trust*, encourages the free exchange of ideas, and enables all to reach their highest potential (p. 6); establishes clear standards, practices, and procedures and expects *fairness* in the interactions of students, faculty and administrators (p. 7); recognizes the participatory nature of the learning process and honors and *respects* a wide range of opinions and ideas (p. 8); and upholds personal *accountability* and depends upon *action in the face of wrongdoing* (p. 9)."[13]

Institutional Culture Matters

As scholars and Christ-followers, teachers in Adventist schools and universities commit to learning and growing together with students as Christ's living body in their academic community. Orientation to the institution,

for employees and students, and to each class should include a review of the institution's mission-aligned academic-integrity standards and policy, as well as processes to be implemented when these are breached. Formal processes serve to (1) centralize records to provide context (is this a first offense or a pattern of behavior?) that informs how the case is handled, (2) ensure consistency of penalties for similar offenses, and (3) provide students an appeal option by an impartial third party (see Andrews University[14] and MIT[15] standards, including training tools for staff and students). In combination with intentionally modeling and teaching academic integrity, schools need to develop policies and processes that define the appropriate approach(es) the academic community will take with those who breach integrity standards.

To achieve the mission of Adventist education, in an age of shifting moral and ethical thinking about the use of online resources, Adventist program outcomes must include at least one outcome relating to faith integration, ethics, and virtues. Teachers thus have opportunities to make connections between the program's ethics class and the application of academic integrity in other classes. A short presentation in the first week, with impromptu reminders of what the culture of integrity means in context, is key.

In online higher education, students build trusting relationships with their professors and academic advisors, whose teaching and nurture helps them navigate academia and life in order to achieve their unfolding career goals. When advisors help students set up realistic study loads for their situation, this can reduce the temptation to cheat. Advising students to enroll in classes that build skills in academic integrity (e.g., college writing) early is another strategy to maximize integrity. Other student-life professionals who serve online students (e.g., librarians, counselors) must also model and teach virtues and values that positively influence students to resist dishonesty in any form.

Recognizing the diversity of student backgrounds, teachers can plan online discussions of specific components of academic integrity applicable to various lessons. They can also help all students engage and belong by inviting and affirming their divergent experiences. Regular monitoring of student participation in forums, e-mails, texts, and calls helps teachers learn which expectations need clarifying; rapid responses help students keep engaged and on task.

All educators in Christian online learning communities have the privilege of praying with students. Being real by sharing personal experiences, remembering what students have shared, and following up via digital communication tools students prefer builds trusting relationships that help students thrive, which in turn reduces at-risk behaviors such as dishonesty.

Crafting learning activities that reinforce a culture of genuine care and modeled integrity further mitigates dishonesty and ensures student achievement of desired learning outcomes.

Learning With Integrity

Designing learning activities and classes to minimize the temptation to cheat is an important proactive strategy. While the mission of Christian education focuses on inspiring students to choose to love and live for Christ, the reality is that we all fall short of God's ideal. Being aware of and prepared to reduce breaches of academic integrity is essential to facilitating learning with integrity.

Honor codes, explicit instructions, and assignment design, briefly shared in this section, are strategies that help students choose to learn with integrity

in a community valuing academic integrity.

A student honor code included in course orientation and as the first item on assessments can remind students of the ethical choice they make as they demonstrate their learning. Students may be asked to copy or paraphrase wording such as: *I promise, on my honor, and in adherence with the Integrity Standards of [school/university name], that I will neither give nor receive unauthorized assistance in completing this learning activity.*

Teachers can reduce stress by writing explicit instructions for every learning activity, including samples and rubrics that are discussed in class. They need to be clear about what learning must be completed alone, when group work is allowed, and how work will be graded. They should estimate time commitments for major learning activities and review the hours per week students should be scheduling in and out of class to succeed. In online studies where students figure out more alone, the ability to reread or have clear, written instructions read aloud, use online translation tools, or have a tutor able to comprehend and help depends on the quality of scaffolding the teacher provides through detailed procedural information.

Making the creation of a course syllabus a collaborative project in the first week of class increases ownership, as it provides students with choices about major projects and due dates and allows them to ask questions that will help clarify expectations for all. While learning outcomes and institutional policies are nonnegotiable, allowing customization of learning activities and assessments can provide many benefits.

Structuring term papers with several partial deadlines increases learning with integrity. For example, students can submit their topic for a term paper early in the term, an outline a few weeks later, a first draft with peer review after a few more classes, and the final paper at the end of the course. Breaking down larger assignments with more opportunities to clarify and review formative feedback reduces opportunities to procrastinate and therein the pressure to plagiarize.

Another approach to maximizing academic integrity is to create assignment questions that require individual application. In this digital age, whether learning online or on campus, students use the Internet, so the following examples are relevant in any learning format:

- Instead of an essay describing the tenets of Plato's philosophy (for which responses would vary little), have students analyze an event or concept in their recent experience according to Platonic thought.
- In a nutrition class, a plagiarism-resistant assignment could require a log of everything a student eats for a day, with an analysis of what was eaten according to the diabetic diet, without moral judgments by the teacher or student. It is highly unlikely that every student will list the same foods eaten for three consecutive meals with the same analysis. If this does happen, even the most forgetful teacher would likely have a strong feeling of *déjà vu*.
- In a course on the education philosophy of Ellen G. White, students might analyze how a lesson in another course aligns with Ellen White's views on education. Even if two students choose the same lesson in the same course, the same analysis would raise suspicion.
- In place of an essay describing one of Jesus' parables and its relevance today, students might write an essay about how Jesus would respond to an event that occurred in the past week.

> Investing in character-building education through building trusting relationships, and crafting plagiarism-resistant and authentic assessments may take more time initially, but creative learning activities can be reframed or applied in diverse contexts.

Plagiarism-resistant essays will differ greatly, with fascinating news stories making grading enjoyable. Increasing relevance engages the learner and makes the teacher more connected, relational, and approachable. Students will have more fun, remember more, and regard the class as more practical. Such a positive class climate reduces the urge to copy, and the sense that students can get away with any form of academic dishonesty.

Investing in character-building education through building trusting relationships, and crafting plagiarism-resistant and authentic assessments may take more time initially, but creative learning activities can be reframed or applied in diverse contexts. Time previously spent investigating possible plagiarism cases can be redirected to other worthwhile tasks that will benefit both teacher and student.

Assessing With Integrity

Assessing with integrity is just as important as learning with integrity. In this section, we explore assessment types, designs, and proctoring. Each of these components contributes to student success and to maximizing academic integrity in online courses.

Vary Forms of Assessment

Wherever class and program outcomes allow, create assessments that apply essential knowledge and skills. These may include term papers, group projects, podcasts, videos, presentations, performances, annotated bibli-

ographies, fact sheets, portfolios, a series of reflective papers or blog posts, creating a test and the answers, service learning to meet a community need, or a student-proposed project.[16] Giving students choices in how to demonstrate learning and assessing learning through online discussion posts[17] and several smaller assignments rather than one exam or term paper increases student engagement and decreases the temptation (and opportunity) to cheat.

Where assessments such as a comprehensive test or examination are required (e.g., national or other external examinations) or most feasible (e.g., very large classes), consider administering several assessments rather than one or two comprehensive exams. This allows students to learn teacher expectations with formative feedback, reducing stress and enhancing performance.

Mastery learning is a model that allows retaking tests—either the same or an alternate version—until a minimum score is achieved. Using online instructional tools to randomize questions drawn from a test bank makes it easier to support mastery learning. This excellent revision or self-quizzing option also reduces the likelihood of cheating. Even so, including one or two proctored or supervised exams in a class with mastery quizzes is recommended to ensure that the student taking unsupervised repeatable quizzes is the one who is enrolled in the online class.

Another plagiarism-preventing strategy is to structure assessment essays so that students cannot regurgitate assignment answers. Consider a class with one assignment on the image in Daniel 2, and another about the beasts of Daniel 7: An examination essay could ask the students to compare and contrast the two visions. Students are thus unable to directly copy or write memorized assignment answers because they must analyze and synthesize what they learned to create a unique exam response.

Creating Online Assessments

Consider the following when setting up an online test in any learning-management system:

- In the syllabus and where assessment reminders are placed, clearly state what materials are allowed during the assessment (e.g., calculator, Bible, textbook if an open-book test), as well as the time allowed with a deadline for completion. Multiple communications are helpful to all, but particularly support students experiencing online proctoring for the first time and students working with tutors or special accommodations who need more time to prepare.
- Provide a comprehensive review of what will be included in an assessment, consistently placed in the course space along with the assessment link. Include a reminder for students with disability accommodations to bring appropriate documentation for proctors to provide additional time or technology support that sets such students at ease from the start of their exam session.
- Include in the syllabi the instructor's right to require alternate forms and locations of assessment, so changes can be made on an individual basis when dishonesty is suspected.
- Randomize the order of multiple-choice questions and answer options within items. If possible, randomly draw test items from a larger pool of questions testing each learning outcome, so each student receives a different test.
- Set up test duration so students lose online access once the allotted time expires. Display a countdown of time remaining in the assessment window online. This allows proctors to focus on observing students rather than timekeeping, and provides students with guidance on how to spend available time.
- Use passwords to limit access until the student is in the presence of an approved proctor. This is essential for in-person and remote proctoring (via video conferencing).
- Provide all instructors with training so that they can consistently implement standards like password control, randomization, and clear instructions. Provide all proctors with training in how to check students in at an exam session, manage passwords and accommodations, troubleshoot technology, observe students' actions, and document any suspicious behavior or clear evidence of cheating. Proctors must be persons of integrity, calm and caring, quick to learn, with clear speech and excellent written communication skills.
- Wherever feasible, use a custom browser that permits students to access only the assessment in their learning-management system (e.g., Respondus Lockdown Browser). Test the program thoroughly, and know your students' situations before setting this up, as corporate policies (institutional or product policies) may not allow the installation required on the local machine. Proctoring without this security feature requires greater surveillance, including a second device connected to the same video conference.
- If possible, use a variety of question types both within each assessment and between various assessments in a class. Be sure the assessment review outlines what kinds of questions will be included. This will improve the quality of student preparation and reduce test anxiety.
- Revise assessments frequently, improving and changing items to thwart leaking of items or entire examination. Ensure that as student learning outcomes are updated in a class, the assessments reflect the change and weighting of what is assessed.
- For open-book tests, activate a plagiarism-detection tool such as Turnitin, and teach students to use this to ensure that they have written answers in their own words and have adequately cited references.
- Display only a few items per screen to limit sharing items, increase focus on current items, and assure students that their answers are regularly being saved online.

Online Proctoring

An institution's commitment to academic integrity includes being able to verify that the student who completes the coursework is the person registered for the class.[18] In online classes, student authentication can be achieved by requiring participants to complete at least one assessment where a legal photo-identification document held up to the screen by the student sufficiently matches the student's face in video conference and his or her name in the online course space. Even in open-book assessments, the identity of the student needs to be verified, so teachers must require proctoring for all major tests or exams.

Currently, there are two ways to supervise students taking exams remotely—live and automated proctoring. Live proctoring services have trained personnel observe students who are taking tests remotely. Automated proctoring services use artificial-intelligence technology to monitor students during the time they are taking examinations. Both types of proctoring require students to connect with a proctoring service through videoconferencing tools such as Zoom, Microsoft Teams, or Google Meet from a device with speakers and a video camera, in a location with reliable Internet access. Automated proctoring services have limitations in differentiating between reasonable Internet bandwidth variations, movements and noises in the student's environment, and skin tones.[19] Brown describes how proctoring services without human interaction discriminate against students of darker skin tones and those with disabilities needing special devices, personal assistants, or accommodations for body movements these automated systems would flag.[20] The need to follow written or audio directions can increase test anxiety for students unfamiliar with automated systems, especially in unexpected situations that may flag or end their test session—but which communication with a person could calm and resolve.

While automated-proctoring options are easier to outsource and expand as enrollments increase, live proctoring offers a better method of supporting the diversity of students who study online. Where some fear that a live proctor's checking of student surroundings and identification constitutes an invasion of privacy, automated proctoring records both surroundings and identification documents, which raises concerns about the ethical use of data. Although live proctoring requires an investment in equipment and employees, the authors of this article have found that the cost of conducting proctoring in-house to be considerably less than outsourcing.

> Having students join an exam session through video conferencing (e.g., Zoom, GoogleMeet, Teams) using their cell phones or tablets adds another angle to observe their actions and that they can use to communicate, should the computer lose connection or power.

In a Christian educational institution, live proctoring requires investment in a testing center with proctors who are committed to the institution's mission and who have received training in how to troubleshoot technical issues and build relationships with students. Having a calm, caring, problem-solving person to help students deal with the stress of test-taking adds value to the quality of student services and increases student success on exams. Furthermore, trusting relationships positively affect student honesty.

Reflecting on their experience in rapidly transitioning a British university to live proctoring through video conferencing, Linden and Gonzalez[21] noted that in carefully planned online exams, students can indeed "demonstrate their learning in a supportive, valid and authentic assessment . . . appropriate for the self-regulated, digital and remote world of work we are preparing students to be a professional member of."[22]

Keep the following in mind to maximize academic integrity through proctoring:

- Require proctoring for open- and closed-book exams, to verify identity. In-person and video-conferencing options can be considered.
- Have the students use their video camera to verify that their physical location is clear of all unauthorized study materials.
- If a lockdown browser is not activated, require screen sharing for device monitoring, checking that all applications not used during the exam remain closed.
- Having students join an exam session through video conferencing (e.g., Zoom, GoogleMeet, Teams) using their cell phones or tablets adds another angle to observe their actions and that they can use to communicate, should the computer lose connection or power.
- Proctors need be granted permission in the learning-management system to be able to view passwords and enter overrides for approved disability and deadline accommodations.
- If proctoring is allowed through external proctoring services, ensure that institutional academic-integrity standards are consistently applied and that student feedback informs contract renewals.
- Establish clear procedural communications with easy appointment management to help students prepare for online assessments.

Conclusion

Plagiarism awareness and detection tools are important, as there will al-

ways be the choice for students to cheat or misrepresent the work of others as their own. In times of rapid technological advances, training in fully understanding technology to be used, including possible unethical uses and the controls set to maximize integrity is essential in every field and at each level of education. Professional development for educators will be needed for them to keep current with forms of academic dishonesty and to stay up to date about best practices for intentionally designing teaching, learning, and assessments to maximize academic integrity.

Faith-based institutions whose mission features education in character building and eternal values have a special calling concerning integrity development. By instilling faith-based academic-integrity practices through good teaching, learning, and assessment strategies, Christian educators have the privilege of collaborating with the Holy Spirit in forming the next generation of honest and honorable members of society. ✎

This article has been peer reviewed.

Glynis Bradfield, PhD, *serves as the Director of Adult and Online Student Services and as Associate Professor of Curriculum at Andrews University, Berrien Springs, Michigan, U.S.A. She has K-16 teaching and leadership experience in Africa and North America. She researches and writes on faith integration, assessment of spiritual growth, online advising and non-traditional student retention and degree completion.*

Ray McAllister, PhD, *holds a Master of Divinity and a PhD in religion and Old Testament studies from the Seventh-day Adventist Theological Seminary at Andrews University. He has experience teaching religion classes online, in which he created "plagiarism-proof" assessments. He is a prolific author who has written in several genres.*

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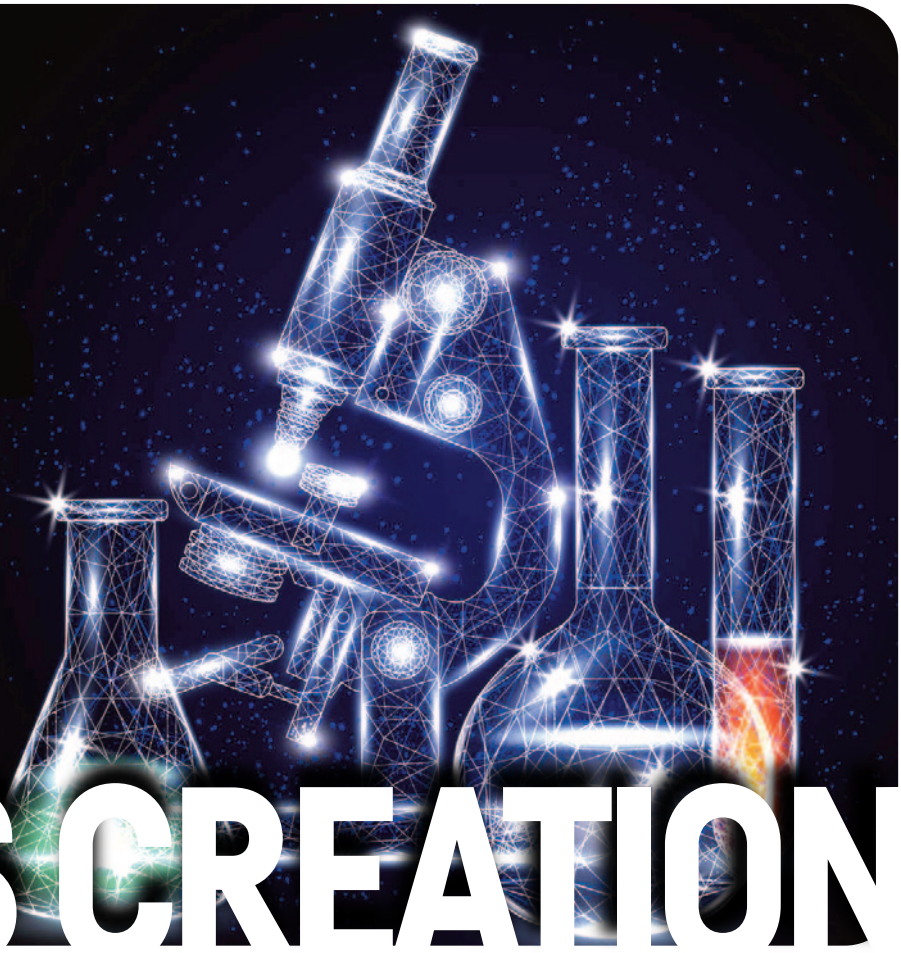
Invigorating Seventh-day Adventist Science Education With Chemical Knowledge of GOD'S CREATION



Chemistry is messy. Not only in the sense that chemical reactions easily spill, stain, and explode—like experiments where students learn to make slime for the first time or run an elephant toothpaste reaction (a chemical reaction that creates a giant, toothpaste-like foam)[1]—but also messy from the perspective that chemicals naturally react in ways that create a wide diversity of molecules rather than just the one that was intended.

I (R.H.) learned this lesson repeatedly during the many months I spent in graduate school as I made porphyrin molecules from raw ingredients.[2] Porphyrin ring structures occur naturally in nature, such as chlorophyll and the heme in hemoglobin. I found from personal experience that it was rare to synthesize a pure carbon-based molecule without producing numerous side reactions. To make porphyrin, one needs to mix the proper ingredients, remove impurities from solvents, frequently adjust ingredient ratios, manipulate temperatures and timing, and then allow the chemicals to work spontaneously from that point. Even after I did all that, the desired product was buried in a sea of side products that needed to be extracted or purified in some way.

Surprisingly, this synthesis and purification experience provided me with a background for understanding the progress of science related to origins-of-life research, commonly called "chemical evolution" or "abiogenesis." In essence, a chemical design model can be constructed to determine what can happen naturally or when intelligence is needed to circumvent natural forces that send chemical reactions in the wrong direction (away from life).

In 1953, the Miller-Urey experiment (see Figure 1 on page 26) showed the conditions necessary to produce amino acids from a few simple gases and "lightning" sparks.[3] The worldwide scientific community immediately claimed that life's ingredients could be easily made under conditions thought to be present on the early,

BY RYAN T. HAYES and D. DAVID NOWACK

Figure 1. The Miller-Urey experiment setup, which created biotic molecules.

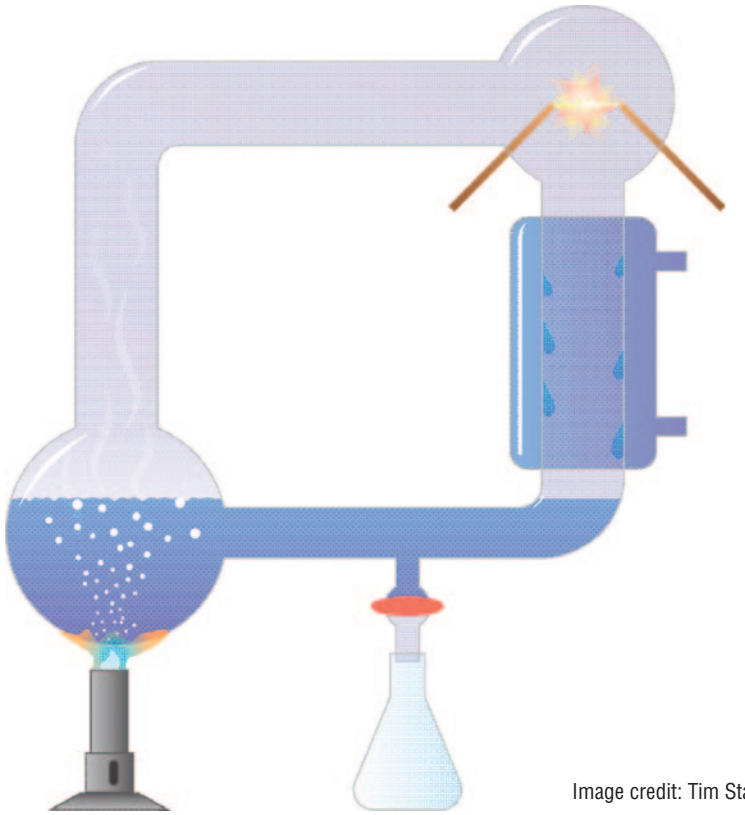


Image credit: Tim Standish.

pre-life Earth, and thus life could easily follow. Further trials confirmed the results of the Miller-Urey experiment and demonstrated that nearly all of the essential amino acids could be made without the need for external intervention.[4] Time, energy, and some simple chemicals appeared to be the "creator" the world of scientific materialism was seeking.

However, Miller-Urey explanations typically leave out the mess that was created by the experiment, which effectively trapped the biotic (molecules needed for life) compounds in a tarry mixture. Amino acids were created in a racemic mixture with a yield of less than one percent, based this article's authors' analysis of the Miller-Urey paper. The gases used in the original experiment were also inappropriate since hydrogen, ammonia, and methane were most likely not available on an "early Earth."[5] It was also recently discovered that the glass of the reactor acted as a necessary catalyst![6]

Regardless of the gases used and catalyst implemented, these experiments have typically produced a messy conflagration of small molecules, most of which are not biotic despite researchers' enthusiasm over generating a few biotic ones.[7] Any oxygen in the experiment blocked amino-acid formation since this creates an oxidizing environment when a reducing environment (one with little or no oxygen) is needed to take the most abundant source of nitrogen, atmospheric dinitrogen, and reduce it to a usable form like ammonia, NH_3.[8] This creates a chemical conundrum since most living systems require oxygen, and there is plenty in our atmosphere, which has likely always been present.[9]

Finally, these reports also fail to mention that critical molecules of life, like ribose, degrade within minutes at high temperatures, which negates the assumed benefits of time and forming life in a hot location like thermal vents.[10] But most important of all, none of these experiments has created anything close to life—just some of the raw ingredients.

In the 70 years since the Miller-Urey experiment, origin-of-life experiments have failed to get much closer to life. "Artificial life" was created in Craig Venter's lab in 2010 by rearranging genes inside bacteria, but the product of this experiment was not made from raw ingredients like air, sand, and water.[11]

Research into the chemical origin of life has shown that conflicting chemical requirements necessary to generate the wide molecular diversity are involved even in the simplest life. Bacteria represent some of the simplest life on our planet, and they require thousands of unique, purified molecules that are made BY the organism from raw materials around it using molecular machines that overcome thermodynamic and kinetic challenges.[12] The biochemical molecules needed by life are created by life and not simply captured from the surrounding environment. Within organisms, what scientists previously regarded as "simple" behavior by atoms has been recognized as an elegantly complex dance coordinated by thousands of molecular machines that were not even imagined 70 years ago.

Clearly, the chemistry in living organisms has not been left to chance but rather is tightly regulated, checked, and rechecked by enzymes, RNA, and biomolecular complexes—all made within living organisms.[13] On its own, chemistry is messy, and that mess is enough to kill cells if not tightly regulated. Even a misfolded protein is extremely dangerous, even though it was formed with the correct sequence.[14]

No set of experiments has been found that demonstrates how the basic ingredients of life such as amino

acids, carbohydrates, lipids, and nucleobases can snap together to form the simplest living organism.[15] Despite what people have heard or read in popularized science sources, nothing close to this has been done in the lab nor verified in peer-review journals.[16] The hope is to string together enough "just-so" events that make abiogenesis seem plausible.[17] The simplest genome in a living organism, *mycoplasma genitalium*, contains more than 580,000 nucleobases, but only a 50-mer has been generated in a lab using plausible abiotic conditions.[18]

Millions of dollars have been spent as top scientists have researched whether abiogenesis is possible without some outside influence. Only recently has "chemical evolution research" become organized and funded through the Center for Chemical Evolution under the National Science Foundation and NASA.[19] Scientists are assembling enough chemical details to piece together a just-so story of how thousands of chemicals could come together to form life.

Figure 2 shows the number of articles published between 1980 and the present on "origin of life" using a keyword search on the Web of Science website. There is a major gap in the naturalist model that attempts to explain how life started on a lifeless rock in space from raw ingredients. We (R.T.H. and D.D.N.) are working with a small group of scientists to evaluate the recent chemical literature for plausible information regarding life generated from non-life. What we have found is that the chemical evidence appears to show that chemistry is messy, water breaks apart biopolymers, time and heat destroy life's fragile components, and cells are highly coordinated, regulated, and controlled chemical factories that possess molecular machines to circumvent the thermodynamic and kinetic challenges of assembling raw ingredients into functional biomaterials.

Our analysis is being compiled into a series of short videos (~ 10 minutes) to articulate this information. The animated videos are insightful and can be enjoyed by nonscientists and scientists of all ages. The first four videos in this "Origin of Life" series are available on YouTube,[20] and we thank the Faith and Science Council for providing some of the funding.[21]

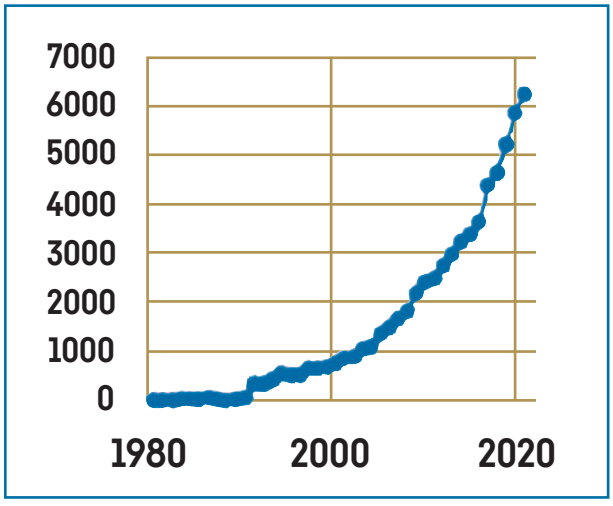
One of the best summaries of this chemical mountain that needs to be climbed is Tan and Stadler's *The Stairway to Life: An Origin-of-Life Reality Check*.[22] This book describes in easy-to-understand language the various chemicals needed to form a living system. As our chemical knowledge increases, our appreciation increases for the intelligence of the supernatural Being that created the chemical engineering that made this world, created life, and keeps it all going!

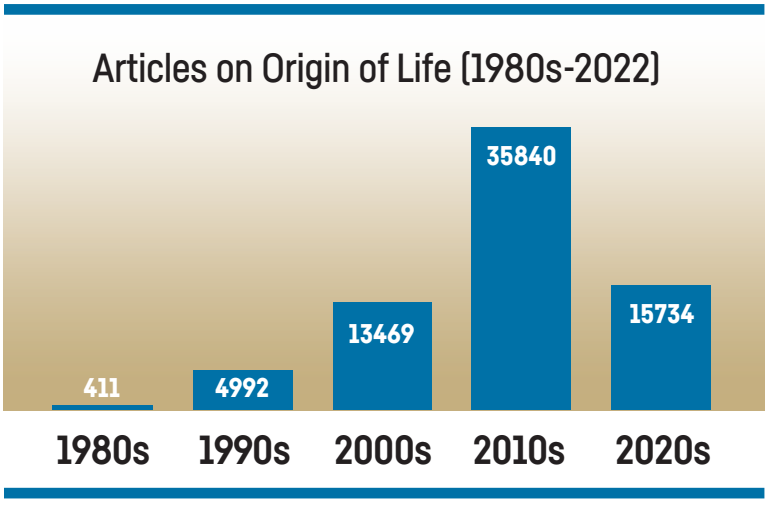
Other Chemical and Biochemical Support for the Existence of a Creator

In the following paragraphs, we will present a few chemical and biochemical details that lend additional support to our perspective on the existence of a Creator. Using these details as the foundation, we suggest that more chemical-design-related information be integrated into the chemical-education curriculum of Adventist schools. There are five aspects to chemical design: the proper ingredients, how these ingredients get selected (selection/purification), what happens with too much/too little of certain ingredients (fine-tuning), how the ingredients are combined into a product (process), and what can happen spontaneously (naturally).

It is important to understand what the chemical forces of nature and time can and cannot do, and whether nature can do anything without an outside intelligence, an outcome that is referred to as "spontaneous" or "natural." Nature can do certain things, such as make *some* biotic small molecules, so this is *natural*. But we be-

Figure 2. Total articles by year and by decade concerning "origin of life."





(Web of Science search, August 15, 2022).

lieve, based on the latest research and firsthand chemical-synthesis knowledge, that nature cannot bring these ingredients together and form life *spontaneously,* which makes many aspects of the natural world *nonspontaneous*. Therefore, we observe things in nature that are both natural and unnatural. To appreciate these chemical design parameters, cooking is a great place to start.

Cooking: Teaching students how to make food from recipes will equip them to appreciate how ingredients transform into final products. Using planned cooking experiences, teachers can equip students with knowledge about amounts, concentrations, heat, freshness, mixing, solids-liquids-gases, timing, and procedures to bring everything together. Through these experiences, they begin to understand when intelligence (external manipulation), is needed or not needed. After explaining the recipe, the teacher can go through the "too much/too little" fine-tuning discussion so that students understand the purpose of each ingredient or process. Advance discussions could center on the role of each ingredient and whether nature can make cookies without human/intelligent intervention. Can freshly baked cookies spontaneously form, given enough time, temperature, and chance interactions? Cookies need only nine or 10 chemical ingredients, but the simplest living system is based on thousands of chemical ingredients!

Earth's Finely Tuned Air: For carbon-based life to exist, a planet is needed that can hold onto its water. It is not easy for a planet to hold onto water, as evidenced by Venus and Mars. Doing so requires the proper gravity, distance from the Sun, air pressure, a protective magnetic field, lack of an electric field, ozone at the correct altitude, and cold-enough temperatures to freeze water at high elevations. This is effectively called the "water trap."[23] If any one of these conditions (as well as many more not listed) is not met, planets lose their water and turn into dry, inhospitable places.

Each gas in Earth's atmosphere plays a key role in sustaining life. When we consider ingredients, selection, process, and fine-tuning of each atmospheric ingredient, the purposes of nitrogen, oxygen, carbon dioxide, water, and ozone for life are revealed. Too much oxygen and the hydrocarbons of life (i.e., trees and plants) will be highly combustible. Adding more greenhouse gases such as water, methane, or carbon dioxide, causes Earth to overheat, resulting in conditions that affect its ability to sustain life, as has been noted in many articles.[24] However, with too few greenhouse gases, Earth would turn into an ice ball! Each chemical ingredient in Earth's air has a purpose that becomes clearer when considering the "too much/too little" scenario. In-depth discussions can center around the chemical cycles for each atmospheric ingredient.

Water's ability to hold onto heat (i.e., high heat capacity), lack of conductivity, low viscosity, high surface tension, high salt solubility, nonflammability, and other properties make it the ideal chemical to support and sustain life. No other chemical has these combinations of properties.

Water's Unusual Properties for Sustaining Life: The chemical properties of water are astounding when compared with those of other chemicals. We live on a privileged planet with an abundance of liquid water on its surface. Most people are very familiar with water's properties, but unfamiliar with the other potential options. The fact that "ice floats" is a chemical abnormality, as only a few elements have this property (e.g., gallium, bismuth, germanium, and silicon). Even though a few other compounds possess this characteristic, water is the only known compound with a combination of life-sustaining properties, which makes it rare. If ice sank to the bottom of a lake or pond, then the fish and other life in the water would have to migrate to the top or be crushed and frozen by the falling ice. If ice sank, then warm liquid water would be brought to the surface and the freezing process accelerated. Since ice floats, it can act as a thermal barrier and slow the cooling of the air and water above it, while maintaining a livable aquatic environment beneath it.

Water's ability to hold onto heat (i.e., high heat capacity), lack of conductivity, low viscosity, high surface tension, high salt solubility, nonflammability, and other properties make it the ideal chemical to support and sustain life. No other chemical has these combinations of properties. There is plenty of water to support life on this planet, although some areas do not have adequate access to potable water. In-depth discussions can take place on the properties of water.[25]

Genetically Coded Information: Just because a researcher *might* possess many of the correct chemicals to make life, he or she would still need to ensure that they are programmed and arranged into the correct sequences. This is referred to as chemical--encoded information, and this code is found in DNA. There are trillions of ways to arrange the nucleobases of DNA, but only a limited set of sequences encode functional information. Scientists and authors such as Stephen Meyer (*Signature in the Cell: DNA and the Evidence for Intelligent Design*) and Douglas Axe (*Undeniable: How Biology Confirms Our Intuition That Life Is Designed*) have helped make this argument.[26]

Without the information, the chemical system to convey the information, and a chemical correction system that maintains that code, life does not have a chance to start or survive. This is called the "Information Problem." We know that capable scientists are excellent producers of useful and specific code, but natural forces, time, and chance are feeble generators of this type of code. Our Creator had the foresight to write the chemical program inside of cells and to incorporate maintenance systems to repair the coded information when it becomes corrupted.

Thousands of defects spontaneously occur each day in human DNA.[27] One unchecked defect can lead to mutations that can cause disease, dysfunction, and death in any living system, although the genetic code and associated systems commonly do an amazing job of preventing these negative outcomes.[28] Inside each living organism is a series of systems that seek out damage, remove the damage, and perfectly repair it.[29] Without this repair, living systems would crumble into a lifeless pile of inert cells. The discovery of these essential systems inside living things is so astounding that three scientists were awarded the 2015 Nobel Prize in chemistry for their work in this area.[30]

Ways Schools Can Convey This Information

How can schools incorporate and implement this information when many students already find chemistry so hard to understand? Here are a few suggestions to help organize the chemical information into a comprehensive K-16 program that points to the Creator:

Primary Institutions: Students can analyze basic properties like density, boiling points, and melting points along with the three phases of matter: solid, liquid, and gas, and apply them to aspects of Earth that are needed for life. In our unofficial surveys of many elementary and high school students, most of them did not know which chemicals are generally found in high amounts in Earth's atmosphere. If students learn the names, formulas, and chemical structures of water, carbon dioxide, dinitrogen, dioxygen, ozone, and a few other basic elements, then a foundation can be laid for an understanding of Earth's atmosphere. Comparing Earth's atmosphere with that of the other planets in our Solar System can help students appreciate the uniqueness of our atmosphere.

Partnerships with local companies or other educational institutions can help create excitement and helpful connections. Andrews University is partnering with the Village Adventist Elementary School's outdoor-school program for 7th and 8th grades to provide the concentrations of various elements in the local creek near Berrien Springs, Michigan.

Secondary Institutions: At the secondary level, in addition to instruction about chemicals, chemical structures, and chemical bonding, students can be taught the percentage composition of our atmosphere (78% N_2, 21% O_2, 0.94% Ar, and 0.041% CO_2),[31] along with an understanding of the density and location of ozone (O_3) in our atmosphere and the dangers of too much or too little of each atmospheric ingredient. This could be compared with the gaseous components of other planets in our Solar System, followed by a discussion of why each component is important for life on Earth. More properties of water should be explained and related to sustaining life.

Tertiary Institutions: In chemistry courses, teachers can continue building a foundation for chemical design: the proper ingredients, source of ingredients, fine-tuning, process, and understanding spontaneity. Chemicals can only do certain things, even when given lots of time and energy. When students see how chemicals work and behave "on their own" within the fundamental forces, they will comprehend that nature is full of "unnatural" chemical reactions knitted together and sustained in intelligent ways beyond the reach of blind chance. We believe that students will thus receive a more purposeful foundation for their future careers in any discipline. One of the authors of this article (R.T.H.) currently provides a 10-part series during the Andrews University co-curricular educational program that helps students to appreciate the chemical design of Earth.

The foundation for our beliefs continues to be solidified by recent findings in science and Scripture. Some

Figure 3. YouTube series on understanding that chemicals cannot come together to form life on their own.

Visit https://www.youtube.com/ playlist?list=PLR8eQzfCOiS0AfFPsMAUYr_VVkpU13uv9.

Adventist scientists are working on ways to supplement our primary, secondary, and tertiary curricula with this information, which points to a loving, protective Creator who supplies all our needs. Every breath we take is a reminder that God chemically provides for our every need without us asking and without us having to earn this blessing.

Conclusion

Seventh-day Adventist education must be on the forefront of taking scientific information and partnering it with the creation story. We, as Adventist scientists and teachers, must learn how to define and defend intelligently designed systems to show they are beyond the reach of chance and time while logically pointing to the benevolent and wise Creator revealed in Scripture. Many of us are collaborating as individuals or through the Faith and Science Council of the General Conference to do just that. Excellent work in geology, archaeology, paleontology, chemistry, math, physics, and biology is being performed that scientifically supports the concept of a Creator. Biological-design information is nicely integrated into the 5th- to 8th-grade *By Design: Journey to Excellence Through Science* textbooks, but more is needed from the other disciplines, especially chemistry.[32]

A new high school biology textbook was recently released that incorporates design thinking throughout the curriculum.[33] Integrating this material is hard work and requires much inspiration and funding to carry out, as well as appropriate training and in-service for teachers. We are grateful for our churches, schools, leadership, and businesses who are partnering and coordinating resources to do the job of integration.

Scientists are not exempt from the duty to proclaim the three angels' messages but rather have additional responsibilities to proclaim that our God is the Creator and Sustainer of all life, since we know "all things were created through Him and for Him."[34] We need to be missionaries in our disciplines and train our students to do the same. It is time for more chemistry missionaries to step up and show the hand of God at work. ✐

Sidebar 1. Additional Resources

Teachers in our elementary and secondary schools do not generally have the tools and information for teaching chemical design, but we are working to solve this problem. It is important to know that our tertiary institutions are doing more to provide this critical information and resources. Please refer to the following:

- GRI (Geoscience Research Institute) webpage (https://www.grisda.org/);
- Adventist Learning Community webpage (https://www.adventistlearningcommunity.com/);
- Southern Adventist University's Faith and Science webpage (https://www.southern.edu/academics/faithandscience/);
- Southwestern Adventist University's Dino Dig page (https://www. swau.edu/dinosaurs/project); and
- Andrews University's summer STEM Boost class webpage (https://www.andrews.edu/cas/stem/boost/index.html).

This article has been peer reviewed.

Ryan T. Hayes, PhD, *is Professor of Chemistry at Andrews University (Berrien Springs, Michigan, U.S.A.). He holds a Bachelor of Science in Chemistry (Honors) from Andrews University and a PhD in Chemistry from Northwestern University (Evanston, Illinois, U.S.A.). Dr. Hayes is committed to sharing basic chemical knowledge in ways that the general public can understand. He gives presentations at churches, schools, camps, and a variety of other venues to stimulate interest in STEM education. In addition to working in academia, Dr. Hayes is actively engaged in research and has worked in industry, business development, patents, as a research scientist, and several other initiatives. To learn more about his work, visit this website:* https://www.andrews.edu/cas/chemistry/research/hayes-research.html.

D. David Nowack, PhD, *is Professor of Biochemistry at Andrews University (Berrien Springs, Michigan, U.S.A.). He earned a Bachelor of Arts in Chemistry Education from Union College (Lincoln, Nebraska, U.S.A.), a Master of Science in Medicinal Chemistry and Pharmacology from Purdue University (West Lafayette, Indiana, U.S.A.), and a PhD in Biochemistry, also from Purdue. He has taught chemistry at the secondary and tertiary levels and has been awarded several research grants from entities such as the Nebraska Coordinating Commission for Postsecondary Education; Bender & Hobein in Munich, Germany; and from the Office of Research and Creative Scholarship at Andrews. He has also been awarded the Zapara Award for Outstanding College Teaching (Union College) and Advisor of the Year (Andrews University).*

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Katherine Koudele

How the "BLUEPRINT" for Agriculture in Adventist Education Can Be Relevant in the 21st Century

Seventh-day Adventists can be justifiably proud of their educational system. It is one of the largest Protestant educational systems in the world, with 9,489 schools at all levels as of December 2020.[1] Its scope is impressive, ranging from preschool through college and graduate school with Master's and doctoral degree programs that include human medicine and dentistry.

Adventists have been overachievers with their school system; however, the membership of the Adventist Church in the United States comprises only 0.41 percent of the population,[2] it operates 2.2 percent of the religiously affiliated schools.[3] In contrast, those who identify with the largest Protestant group, the Baptist tradition, make up 10.7 percent[4] of the U.S. population, and their schools account for 5.3 percent of religious schools.[5] This disproportionally extensive Adventist educational system has been made possible by dedicated faculty, staff, and school administrators who often work for missionary wages because of their firm belief in the church's mission, church subsidies, and parents who support tuition-based education. Church leaders at all levels, along with parents, alumni, and constituents, have also treasured the vision of such education and supported efforts to develop and expand it.

Seventh-day Adventists' Long-standing Dedication to Education

However, education was not highly prized initially; early Adventists in the 1840s did not value educating their children since they believed Christ's second coming was imminent. But by the 1850s, they were advised by church co-founder and visionary Ellen White that their children needed basic skills to cope with the secular world around them, and they also needed to be shielded from ridicule expressed by classmates toward their peculiar religious beliefs, which could result in their leaving the faith.[6]

Homeschooling seemed to be the answer initially, but

this endeavor proved insufficient to meet all students' educational needs. Martha Byington taught the first-known Adventist school in Buck's Bridge, New York, in 1852.[7] James White attempted to begin an Adventist school in Battle Creek, Michigan, in 1858. It was finally organized in 1872 under the leadership of Goodloe Harper Bell and officially sponsored by the then nine-year-old denomination. This followed Ellen White's first comprehensive essay about education in January of that year.[8] In "Proper Education" (1872), later included in *Testimonies for the Church,* she described a "proper education" that in modern parlance would be termed "wholistic." In it, "moral, intellectual, and physical culture should be combined to have well-developed, well-balanced men and women."[9] This combination should include agriculture and manufacturing enterprises at the schools to allow the students' weary minds to rest. At the same time, their bodies worked, and their health improved. The opening sentence in her book *Education,* adapted in *True Education,* summarized her philosophy:

"True education means more than pursuing a certain course of study. It has to do with the whole person, and with the whole period of existence possible to human beings. It is the harmonious development of the physical, the mental, and the spiritual powers."[10]

This idea is reiterated in the North American Division's *Working Policy, Philosophy of Education*.[11]

Although Ellen White never used the term herself, this wholistic approach was termed "the blueprint" by subsequent writers and became a hallmark of Adventist education.[12] Yet, as Floyd Greenleaf wrote in his definitive treatment of the history of this metaphor, there have been many varieties of its definition.

"If we choose to call Ellen White's instruction about education *the blueprint*, the breadth of her understanding of education dictates that we must define the term clearly enough to ensure meaningful discourse. The apt metaphor that appeared in Advent-ese a century ago has lost much of its meaning because writers and speakers have too often twisted it to suit their purposes. Sometimes it has become a weapon to separate supposed educational goats from supposed sheep. For some, it has been a kind of imprimatur to authenticate a given program, institution, or even a person as 'traditionally Adventist.'"[13]

"As a result of Ellen White's counsel, Adventist colleges and secondary schools settled on large tracts of land where they established dairy herds and cultivated extensive acreage—often in single crops such as corn or wheat for a cash market."

How Agriculture Has Changed in the United States Since 1900

I do not intend to wade into all the components of "the blueprint" in the following discussion. Still, I will focus on the component considered essential in almost all definitions: agriculture—a discipline I have been involved with professionally and personally for the past 36 years. I will also confine my remarks to agriculture in Adventist education in the North American Division.

In the last decade of the 19th century, when Ellen White wrote extensively about what should comprise Adventist education, 40 percent of the United States population was actively engaged in agriculture as an occupation. Simultaneously, those living in rural areas comprised 60 percent of the total population.[14] These numbers began to decrease in the years that followed. By 2000, less than 10 percent of the U.S. population actively engaged in agriculture as an occupation, and the population of rural areas dwindled to 30 percent as more and more people chose to live in urban areas and pursued non-agricultural careers. By 2020, those living in rural areas comprised 14 percent of the U.S. population.[15]

Therefore, in the late 19th century, the students who attended Adventist schools likely had a farm background or farming experience in a rural area. Church historian George Knight described that "agricultural education was relevant and useful for almost everyone at this time. In many places, land was almost free, and all a person needed to begin was a horse and a plow. Success resulted from putting as much land under cultivation as possible."[16] "As a result of Ellen White's counsel, Adventist colleges and secondary schools settled on large tracts of land where they established dairy herds and cultivated extensive acreage—often in single crops such as corn or wheat for a cash market."[17]One exception to this was Emmanuel Missionary College [now Andrews University], the location of which was chosen based on the excellent fruit and vegetable production found in southwestern Michigan.[18] EMC also developed a dairy and had a large flock of chickens. Produce raised by the students not only provided food for the school kitchen,[19] it also gave the students practical knowledge and manual culture. It allowed them to sell their produce to the Chicago markets to defray the cost of their tuition.[20]

"In other words, Adventist agriculture programs in

the late 19th century and the early 20th century were inherently practical. Since these procedures fulfilled and harmonized with Ellen White's counsels, Adventist schools have often felt obliged to continue the same programs into the last quarter of the 20th century,"[21] Knight wrote in 1988. But as he pointed out, modern agriculture is expensive and in many cases is no longer relevant to furthering the church's goals for practical training or mission work.[22] "Rather than 'faithfully' and unthinkingly standing by past methods, Adventist leaders need to extract the timeless principles from inspired guidance. They should creatively seek to develop methodologies that will apply the intent of those counsels in current contexts."[23]

Much has changed in agriculture and agriculture education since 1900. First, in 2019, the percentage of the U.S. population working on farms and producing food dropped to 1.4 percent.[24] The percentage of those living in rural areas has decreased as well. Second, due to technological advances, agriculture in the United States has become very specialized, mechanized, and efficient, so fewer people are needed. Third, college-age students are not convinced that a career in agriculture and related fields is for them.[25] They do not see it as relevant. In Adventist circles, the message is sometimes subliminally presented that the primary professions that should be pursued are preacher, teacher, doctor, or nurse.

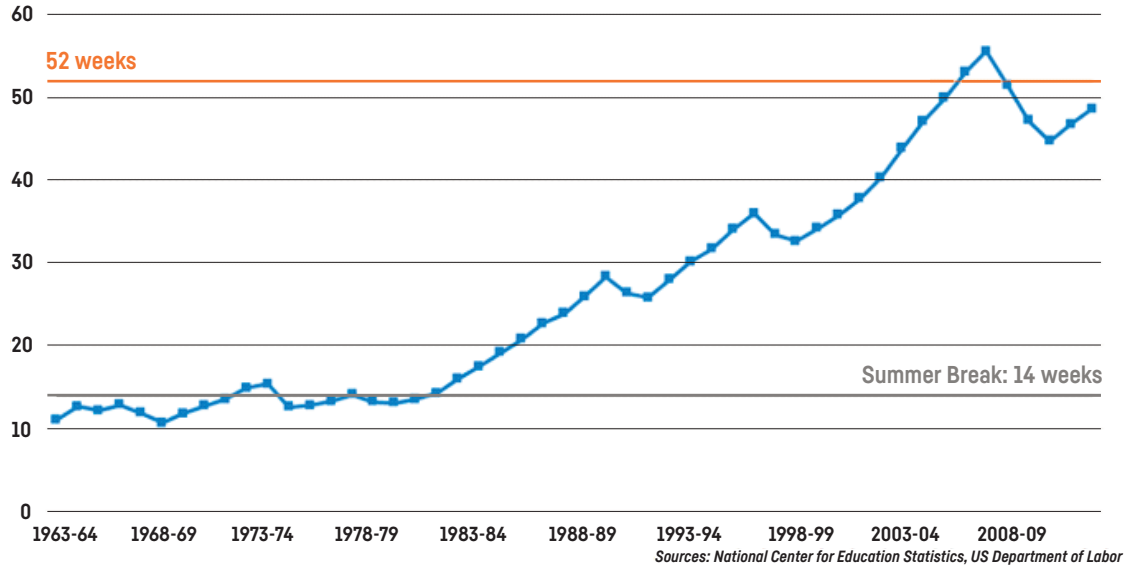
Updating the Timeless Principles of the Blueprint for the 21st Century

Now that we are well into the 21st century, how can agriculture programs be made relevant using the "timeless principles" in Adventist education of a spiritual and whole-person education centered on service? Let's consider some ideas to *abandon*:

1. *Students can work their way through school.* Tuition costs for secondary and tertiary students have greatly exceeded the rate of inflation in recent decades. As a result, it is now impossible for college students to study and work to pay their way through school. (See Figure 1).[26] While this chart shows the costs for college students in public institutions, it also represents the situation for students in private schools.

2. *All that is needed is arable land.* Indeed, large tracts of land, significant infrastructure, and time commitments are needed for students to learn the "timeless principles." However, more is required to sustain

Figure 1. Number of full-time weeks of minimum-wage work needed to pay for the average tuition of a four-year public institution.



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such programs. A few years ago, a colleague and I toured several Adventist academies that once had thriving agriculture programs. We interviewed current and former faculty members about what had happened to this program. The reasons they cited can be divided into three categories:

- *Lack of leadership:* A significant challenge was finding a leader for the school and for these programs, both of whom had a good understanding of the discipline, would champion these programs, and would stay at the school for a significant number of years. Many schools seemed to have a too-frequent turnover of administrators who each brought new ideas about what to do with the agriculture infrastructure. When there were frequent changes in administration at the conference level, this also impacted the level of support for these programs.
- *Viewing agriculture programs as income sources.* Another challenge comes when schools attempt to make the agriculture program a source of income. Lack of funds at most private schools is a perennial problem, and anyone involved in agriculture knows that there will inevitably be lean years; therefore, it should not be relied upon for a steady source of funding at the scale it is conducted at most schools. Most of the academies had remnants of some donor's good idea about reviving the agriculture program that now is little more than abandoned hydroponics projects or neglected greenhouses. The sight of this decaying infrastructure has a demoralizing effect on the faculty and staff, parents of potential students, and the community. Furthermore, reliable labor is difficult to find. Students often return home in the summer during most of the growing/harvesting season; thus, the school must employ others to do the work. Ironically, the whole reason the school year was set up the way it is in the United States with summers off was to allow students to be at home and help out on the family farm.
- *Lack of connection to the overall curriculum.* Expecting the agriculture program to flourish when there is no curriculum connected to it is also a drawback. We noticed that, with one exception, the schools did not have any classes connected with the agriculture program. In the case of the one exception, a check of that academy's webpage in late December 2021 showed that the academic portion of the agriculture program no longer existed. The faculty member leading it when we visited had moved to another school. In many cases, students wouldn't know why they were asked to enroll in the program, and so they would participate without an understanding of the underlying principles. This could contribute to a decrease in interest and ownership of the program by the students, constituents, and conference administrators.

Agriculture can be an applied-STEM discipline. For example, students use math, chemistry, biology, physics, and engineering to accomplish their goals in agriculture. They need to understand what they are doing as they apply what is learned in their science classes to agriculture.

There are, however, ideas that should be *embraced*. Here are a few to consider:

- *Education is our product.* We need to remember that, first and foremost, we are in the education business, and education is the product we sell. But not just any education! We offer education that points to redemption in Christ by which students can cultivate a growing relationship with Jesus that transforms their lives and impacts humanity. Since students can no longer work their way through school, adding a strictly business model to a school's agriculture program only serves to dilute the main product of the school, which is education. However, as educational institutions, we can use agriculture as a teaching tool to illustrate timeless principles of life found in other subjects.

Agriculture can be an applied-STEM discipline. For example, students use math, chemistry, biology, physics, and engineering to accomplish their goals in agriculture. They need to understand what they are doing as they apply what is learned in their science classes to agriculture. They need assignments that challenge their creativity and ingenuity. Working with professors and mentors lets them engage in research projects that pair agriculture with what they learn in other classes.

- *Broaden the definition of agriculture.* We need to broaden the definition of agriculture to include environmental stewardship. Farmers consider themselves stewards of the land, so this concept is appropriate.[27] During Ellen White's lifetime, the idea of environmental stewardship was in its infancy[28]; therefore, she did not write about it explicitly.[29] But she did write many times about the importance of clean air and water to human health,[30] and these are also the goals of the environmental movement. This concept resonates with our students. The "Letters to the Future President Project," which involved more than 11,000 high school students from 321 schools across 47 states, was conducted by

Gracia et al. at Stanford University.[31] When the content of these letters was analyzed, the topic of care for the environment ranked eighth out of 69 topics the students wrote about, and animal welfare ranked 12th.

How to Apply and Update the Original "Blueprint" for Adventist Schools in the 21st Century

How, then, can Adventist schools apply and update the original principles of the "blueprint" in the 21st century? Below are recommendations that can be implemented at all levels, along with organizations that offer resources that can be used to support projects:

Composting and Recycling

- One project that engages the entire school is setting up and maintaining a composting and recycling system. This appeals to students' sense of caring about the environment and likely raises their estimation of their school. Such programs can also teach students how to implement what they learn in their current and future homes.

Composting and recycling projects take extra time and effort on the part of the faculty and staff to set up and maintain, so they need to involve the students as much as possible to help them understand why these projects are assigned and their importance, and so that they share some responsibility for the program. To have the most impact on learning, these projects need to be seen as part of the larger educational curriculum and have the buy-in of all employees at the school as well as the school board. And there is biblical support for caring for the Earth which God created for us.[32]

Another project that can benefit students long after they leave school is learning how to plant gardens, either on plots of land or in containers. Learning how to plant and maintain a garden that can help feed their families and minimize the expenditure on produce from commercial vendors will serve students well throughout their lifetime. They can learn how to plant and harvest vegetables, herbs, flowers, and even fruits.

In addition, gardening is an excellent form of exercise, results in healthful foods, and can help sustain the environment by providing plants for pollinators (for example, butterfly gardens). One example of this is the Moab Seventh-day Adventist Church's collaboration with Castle Valley Academy to provide potatoes for the community. Read more about this initiative here: https://utahstories.com/2022/09/the-seventh-day-adventist-faith-based-high-school-in-castle-valley-utah-will-produce-half-a-million-pounds-of-potatoes-this-year/.

Another example is "The Edge"—a community flower and vegetable garden on the Walla Walla University campus (College Place, Washington, U.S.A.) created to be a gift to the community. Initiated by Troy Fitzgerald, outreach pastor for the university church, the garden is designed to be a place where community membrs can freely "gather, collect, and share" (see https://www.wallawalla.edu/news/detail/news/gifting-the-edge/. And Andrews University offers an example with its venture into sustainable agriculture: https://adventistreview.org/news/andrews-university-invests-in-sustainable-agriculture/. Research on the value of school gardens continues to grow, a sampling of the benefits is available here: https://www.gse.harvard.edu/news/uk/18/07/let-it-grow.

In addition, some organizations offer resources that can be used to help implement various projects or generate new project ideas. These include the following:

- The Cornell University Institute of Waste Management has produced a helpful guide on how to start a composting program in schools.[33] The composting process involves chemistry and biology, while the bins involve engineering. The composted material can then be used for mulching around the plants in the school's landscaping, incorporated into the soil of a raised-bed kitchen garden for the cafeteria, or shared with parents and church members for their own gardens.
- CleanRiver Recycling Solutions has developed a step-by-step process for starting and maintaining a recycling system for a school.[34] This project raises the students' awareness of what happens to the waste they generate every day. They become partners in caring for this planet entrusted to humanity.
- *The National 4-H Council.* The National 4-H Council has a wealth of well-designed curricula and materials involving STEM in agriculture, animal husbandry, veterinary science, pet care, and gardening.[35] There are plenty of options from which to choose. The materials are arranged by grade level. I have used their materials and found them accurate and engaging for the students. There is a modest charge for most of their materials.
- *The American Farm Bureau Foundation.* Consider checking out the American Farm Bureau Foundation and its educational programs for a broad overview of producing food.[36] Their Foundation for Agriculture contains ideas and materials arranged by grade.[37] Some resources include education in human nutrition and healthful eating, which are greatly needed today. Their materials are free to download since agriculture industry groups support them. Educators should be aware that some materials might contain bias and should be used cautiously.
- The American Farm Bureau Foundation also has two STEM units that explore genetics (high school level) and the ecosystem (middle school level).[38] The organization supports raising animals for meat; however, raising awareness of animal husbandry and using animals to illustrate the scientific method is not the same as promoting meat-eating.

Summary

Seventh-day Adventists have established a worldwide, robust, and wholistic educational system following the principles (also known as the "blueprint") expressed by church co-founder and visionary Ellen G. White. To remain relevant in the 21st century, updates and modifications need to be made to the applications of the agricultural portion of the "blueprint" to maintain the timeless principles found in it. Faculty, staff, and administrators of Adventist schools who wish to adhere to these principles should examine cost-effective ways of delivering that content that engage the minds and imaginations of their students.

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Katherine Koudele, PhD, *is Professor of Animal Science and Chair of the Department of Sustainable Agriculture at Andrews University (Berrien Springs, Michigan, U.S.A.). She holds both a bachelor's degree in biology and chemistry, and a Master's degree in biology from Andrews University, and a doctorate in animal science from Michigan State University (Lansing, Michigan). Dr. Koudele is the pre-veterinary advisor at Andrews for students interested in working in places such as zoos, dairy farms, horse farms, camps, ranches, dog training, and much more. Her areas of research interest include animal behavior and management and, in collaboration with the Horn Archaeological Institute, the analysis of faunal remains from the biblical city of Tall Jalul, Jordan.*

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Shondell DeVelde

Promoting Nutrition Education in Seventh-day Adventist Schools

"Let food be thy medicine, and let medicine be thy food."[1]

The bones, muscles, nerves, organs, and tissues of our bodies are built up and repaired from the food we eat. Each organ of the body requires sustenance from good nutrition, which nourishes the blood and sustains life. Choosing the right foods, however, can be a challenge. Many people rely on appetite, but this is not a safe guide. Poor eating habits have caused the appetite to become distorted. Untrained appetite habitually demands food that can impair health and cause weakness instead of strength. The ability to choose the right foods is also influenced by other factors such as food allergies and the availability and cost of healthful foods.[2]

Educators must carefully guide their students' food preferences and eating habits away from society's unhealthful trends. Previously, chronic diseases such as obesity and type 2 diabetes were associated with older adults. However, this trajectory is changing as more young people are diagnosed with these illnesses. Globally, unhealthful eating and sedentary lifestyles are two major causes of the high prevalence of chronic diseases among the young.[3] God's ideal is that we prosper and be in good health. "Beloved, I pray that you may prosper in all things and be in health, just as your soul prospers" (3 John 1:2, NKJV).[4]

School-based nutrition education can help children and young adults experience optimal health and well-being. When students receive appropriate food knowledge, learn how to make healthful food choices, and access healthful foods at school and home, this will propel them to practice appropriate dietary behaviors. While younger students may not have much choice about the food cooked at home, what they learn at school about healthful choices can help them make better choices. Through interaction and collaboration, the home, school, and church can help teach the importance of healthful living, but this process requires commitment and consistent implementation.

Agencies of Adventist Education

Children's first and most significant educational center is the home, with parents as the most influential teachers. Parents are responsible for reflecting God's character to their children, and the entire familial setting shapes children's values, attitudes, and worldviews. The church, the school, and other societal educational agencies thrive when they build on and supplement the work of the home.[5] The church also plays a role in supporting the home and school in facilitating nutrition education. Nutrition and health programs offered by Pathfinder clubs, Sabbath school, Vacation Bible School, and other organ-

izations can help reinforce food and nutrition concepts. Even though school-based nutrition education is designed to help children make healthful food choices and practice appropriate dietary habits, nutrition education needs the support of the home, church, and community to have the desired outcome in the lives of children.

Cultural, social, and environmental interactions and practices, the accessibility of food and physical resources, and marketing practices by the food industry can either positively or negatively affect people's ability to make healthy food choices and practice healthful eating.[6] The fact that for a large portion of the year, many children spend most of their waking hours at school[7] means that schools must play a significant role in facilitating effective evidence-based nutrition education, which includes providing healthful food in the school cafeteria

Interview With Two Prospective Nutrition Students

In 2021, I surveyed students in one of my classes. From a class of 15 9th-grade students at Grand Bahama Academy, a Seventh-day Adventist school in Freeport, Bahamas, only two students chose food and nutrition as one of their electives. I became curious about why these two students chose food and nutrition as an elective when their classmates chose either physics or commerce as electives. Table 1 on page 41 shows the questions and student responses.

Evaluation of the Students' Responses

The two students interviewed were the only Adventist students in the class. They regularly attended church and participated in many church programs that catered to their growth and development. During the interview, it became evident that the students' familiarity with food and nutrition came from influences at home and in their local church.

Although I teach in an Adventist school, most students in my educational setting come from homes without any Adventist presence. Some of these students demonstrate basic knowledge of nutrition principles, but many have much to learn compared to those from Adventist homes. As educators, we should approach situations like these as an outreach opportunity to teach children and young adults about healthful eating and other essential dietary practices. God will bless this effort, and those messages may extend beyond the classroom walls to homes and communities.

What Is Nutrition Education?

Education is not only the transmission of knowledge but also the propensity to create curiosity in individuals that will inspire them to seek new knowledge and add to existing knowledge. These decisions can result in behavior changes that foster the individual's wholistic growth and development. Nutrition education may be defined as the teaching and learning of concepts as well as all educational strategies designed to aid people in making appropriate food choices and engaging in other nutrition-related behaviors. Nutrition education also includes educational techniques and community support to nurture health and well-being as individuals adopt healthy food choices and dietary behaviors.[8]

People experience two fundamental issues because of limited nutritional knowledge: an inadequate diet that does not provide the required nutritional needs and an unbalanced intake of calories or recommended dietary components.[9] Nutrition education seeks to arm

Table 1. Interview With Two Prospective Nutrition Students

Student 1	Student 2
Question 1. What is your understanding of the term *food and nutrition*?	
Food and nutrition is a subject that explains ways through which the body gets energy from nutrients found in the different types of food.	Food and nutrition class tells us about the foods that a person should eat or should not eat to help them stay healthy. Food and nutrition teach children how to prepare a healthy diet.
Question 2. Is any aspect of nutrition taught in other subjects that you studied? If yes, can you name those subjects?	
Yes, I have studied food and nutrition in health-science classes. Some of the topics covered are food groups, fats, protein, carbohydrates, and the nutrients they provide for the body.	Yes, I have studied aspects of nutrition in health-science classes. The topics that I remembered are vitamins. Vitamins are divided into two groups, fat-soluble and water-soluble. Fat-soluble vitamins dissolve in fat and they are vitamins A, D, E, and K. Water-soluble vitamins dissolve in water, and they are all the B vitamins and vitamin C. All vitamins are required to keep the body healthy.
Question 3. Why have you decided to study food and nutrition?	
Food and nutrition will increase my knowledge of developing new food products with the help of technology and science. It will also provide me with knowledge about the correct amount of energy that the body needs daily to function properly.	I have decided to study food and nutrition because knowing about nutrition and practicing a healthy lifestyle is the best way to prevent certain diseases. Also, God loves when we take good care of our bodies.
Question 4. Have you learned food and nutrition concepts and skills at home? If yes, share some of the concepts learned.	
Yes. My mother teaches me about the importance of good nutrition including the number of various nutrients that I should have each day to provide the correct amount of energy that the body needs each day.	I have learned that my body is the temple of God, and I should not put anything harmful into my body. I should eat a plant-based diet as much as possible.
Question 5. Have you learned anything about nutrition from your local church? If yes, share information that you have learned.	
Yes. My church has health programs that teach about good nutrition and its importance for human life. Good nutrition helps to build the immune system and fight against diseases. The church also teaches that God expects us to practice healthful eating and follow the instructions from the Bible about healthy eating.	I have learned from health programs at my church that good health includes healthy eating and exercising regularly. I have also learned that sunshine, rest, and trust in God are important to good health.
Question 6. Can you share at least one Bible verse that supports nutrition and health?	
"Therefore, whether you eat or drink, or whatever you do, do all to the glory of God" (1 Corinthians 10:31, NKJV).*	"And God said, 'See, I have given you every herb *that* yields seed which *is* on the face of all the earth, and every tree whose fruit yields seed; to you it shall be for food'" (Genesis 1:29, NKJV).
Question 7. What are some concepts that you expect to learn from the food and nutrition class?	
I am looking forward to learning the principles of nutrition and understanding its importance to the human body. Also, how to prepare and serve healthy foods.	How to supply my body with the healthiest foods. Why eating certain foods keeps the body healthy and how to practice a healthy lifestyle.

individuals with the necessary information, motivation, and skills to acquire and eat what is necessary for the body to function.[10]

The Importance of School-based Nutrition Education

Nutritional knowledge and cooking skills are essential in helping students develop appropriate dietary habits. Providing children and young adults with access to adequate nutrition education and healthful food at school is a significant way to foster both long- and short-term benefits for improved health and learning outcomes.[11] Outside of the home environment, the time children spend in school provides the opportunity for a greater immersive experience in nutrition education than the time spent in any other institution. School-based nutrition education helps children and young adults establish healthful eating patterns early in life by providing them with the knowledge that leads to healthful practices and positive attitudes about food.[12]

Nutrition education should be an essential aspect of a school's wholistic health-education curriculum because it provides students with information and skills to make healthy food and beverage choices.[13] Schools help students to develop healthful eating behaviors by exposing students to:

- Appealing, nutritious foods and beverages;
- Accurate and consistent information about good nutrition;
- Appropriate methods to learn and practice healthful eating;
- Encouraging faculty and staff to model healthful eating habits.

The most popular intervention to attract students to school, increase their learning abilities, and keep them in school are organized and consistent school-nutrition programs.[14] However, the success of these outcomes depends on the program design and context (see Sidebar 1 on page 43).

Nutrition Education Must Be Comprehensive and Extensive

While nutrition can be taught as a stand-alone subject, it is easily incorporated into other disciplines such as religion, chemistry, history, social studies, biology, agriculture, and health science.[15] Some examples are as follows:

- Counting with pictures of fruits and vegetables (mathematics)[16];
- Learning fractions by measuring ingredients for a recipe (mathematics)[17];
- Learning about the nutrients found in different plants (science)[18];
- Learning about cultural foods and traditions (social studies)[19];
- Learning how foods contribute to the functioning of the body (health science);
- Identifying biblical instructions about food and diet (religion).

To facilitate a comprehensive nutrition-education curriculum, school administrators, teachers, and curriculum planners should regularly meet to discuss how to include nutrition education in their lessons and schoolwide instructional activities. These meetings should also include plans to ensure that the school's nutrition program sets a good example (see Sidebar 2 on page 43). Possible areas to discuss may include the following:

- Effective strategies for facilitating a sustainable nutrition-education curriculum;
- Parallel activities (classroom, schoolwide, church, and community) that can help teach positive dietary behaviors;
- Ideas for sourcing and sharing resources and expertise among educators;
- Reinforcement of important nutrition concepts across disciplines;
- Ways to avoid presenting conflicting nutrition information during instructional sessions; and
- After-school and extra-curricular nutrition activities that extend beyond the classroom.

Nutrition and the Development of Skills, Well-being, and Faith

Good nutrition influences mental and physical growth and development during the early stages of a child's life. Food habits to which they are exposed and that form during infancy influence children's food practices and preferences in later stages of life.[20] Studies have found that children's well-being and potential ability to learn improve from access to good nutrition, leading to better academic performance.[21] Nutrition education is a major aspect of fostering sustained healthy behaviors. It should be taught from as early as preschool as a major component of his or her wholistic development.[22]

Skill Development

The goal of a well-balanced nutrition-education program is to transmit appropriate knowledge about food, its functions, and its importance to the body. Nutrition curriculums should therefore be comprehensive and engaging and offer skill-focused training to help children to attain nutrition knowledge and develop experiential culinary skills.[23] Programs that arouse interest and provide opportunities for participation in practical activities such as gardening, cooking, and tasting food can empower students as they learn about good nutrition and its impact on their well-being throughout their adult lives.

Teaching and learning sessions for nutrition inside

Sidebar 1. Other Activities That Schools Can Use to Promote Nutrition Education

While teaching children and young adults how to make healthful choices is essential for their long-term health and well-being, most do not make choices about what to buy. This decision is made by their parents and is influenced by the availability, cost, and access to healthful foods. The school and church can work together to meet this need in a variety of ways:

- Plant school farms and gardens to teach students how to grow healthful foods.
- Ensure that only healthful foods are prepared and sold on the school campus.
- Share short nutrition messages during morning announcements.
- Give nutrition talks during chapels, assemblies, and other school programs that not only direct students to accurate sources of nutrition information but also warn against inaccurate sources.
- Send nutrition information to parents and guardians in newsletters and flyers.
- Use staff meetings and professional-development sessions to enhance teachers' nutrition knowledge.
- Share nutrition information at parent-teacher meetings and parent information sessions.
- Participate in creating and facilitating community nutrition programs that include topics such as food-borne illnesses and food-related diseases in addition to nutrition topics.
- Place food and nutrition posters and pictures in strategic areas on the school campus to promote healthy eating.
- Use social media to send nutrition messages to students and their parents.
- Provide a weekly nutrition newsletter to share appetizing and easy recipes for cooking unfamiliar but healthful foods.
- Offer vegetarian cooking lessons for parents and the community.
- Work with the church to operate a food bank that offers healthful foods either free or at a nominal cost.

Sidebar 2. Some Possible Barriers to Facilitating Nutrition Education in Adventist Schools

- Lack of a government mandate that food and nutrition must be taught as a stand-alone discipline or subject area. In some schools, nutrition is incorporated into other subject areas, and this is good; however, stand-alone topics allow for more focused instruction.
- Nutrition concepts can be included in other subject areas such as health education, health sciences, and biology, which ensures that students have adequate access to nutrition education.
- Limited physical resources such as food labs and their required equipment to teach effective, evidence-based nutrition education.
- Lack of human resources, such as adequately trained nutrition teachers and committed school administrators to facilitate sustained effective food and nutrition programs.
- In some schools, no clear mandate from organizational and administrative levels to teach nutrition education.
- Lack of clear vision about the importance of nutrition education.
- Poor organization and limited supervision of curriculum and instructional activities in some schools.
- The belief that food and nutrition concepts apply only to specific lifestyles rather than critically examining the impact of inadequate nutrition, pollution, pesticides, and inaccurate claims in all diets.

Additional Resources

- Centers for Disease Control and Prevention, "Opportunities for Nutrition Education in US Schools" (2019): https://www.cdc.gov/healthyschools/nutrition/pdf/308155A_FS_SchoolNutritionEd-508.pdf.
- Food and Agriculture Organization of the United Nations, "School Food and Nutrition" (2022): https://www.fao.org/school-food/en/.
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and outside the classroom provide students with opportunities to develop food preferences and learn how to prepare food. Through these experiences, they also learn food-related skills such as correctly reading and interpreting food labels, shopping for healthful foods, meal planning and preparation, food storage, and using leftover foods to make healthful meals. Also, learners enrolled in nutrition-education programs have shown improved self-reported food practices such as food budgeting, food safety, and meal-preparation skills.[24]

Optimal Health and Well-being

Effective evidence-based nutrition education has proved to be a successful approach to fostering positive dietary habits and improving health outcomes for a lifetime. Examples of health benefits for children and young adults include weight loss, a decrease in body mass index (BMI), and the development of a favorable perception of fruits and vegetables, resulting in an increased daily intake of these foods.[25] Many children do not meet their required daily nutritional intake because of unhealthful food-consumption patterns such as eating less than the daily recommended amounts of fruits and vegetables and consuming too many low-nutrient, low-fiber, and calorie-dense foods, high-fat and high-sodium snack foods, and sugary foods, including sugar-sweetened beverages. Skipping meals, not eating required meals on time, and other food-related disorders such as binging, purging, and bulimia, are also poor eating patterns that may compromise students' health status.

Behavior Changes

The school has a vital role in helping children and young people to adopt positive dietary habits, which can lead to lifelong healthful dietary behaviors. Behavioral science research supports the notion that children's "choice architecture" (ways choices are presented so decisions can be made) can be swayed by what is most visible and accessible in the school environment through meals offered. Also, messages transmitted about nutrition can significantly affect children's dietary selections and eating behavior.[26]

Ellen White noted that we must study God's original plan to know the best foods to include in our diet. Fruits, vegetables, nuts, and grains remain God's original diet plan for humans. The simple preparation of these foods in their natural state produces strength, power, endurance, and vigor to the intellect.

A Deeper Understanding of Health Ministry

God wants His children to live healthy lives, and the study of nutrition science guides learners to a deeper understanding of its driving force, the Creator Himself. Educators who develop lessons and instructional activities for their nutrition classes can integrate biblical concepts into the teaching and learning sessions. Biblical principles that can be incorporated into nutrition lessons include the following:

- God's ideal diet for humanity;
- Comparisons of God's recommended diet with typical diets in various societies;
- Relationship between God's ideal diet and health and well-being;
- Relationship between society's diet and health and well-being;
- Changes in humanity's diet after the Flood.

Ellen White noted that we must study God's original plan to know the best foods to include in our diet. Fruits, vegetables, nuts, and grains remain God's original diet plan for humans.[27] The simple preparation of these foods in their natural state produces strength, power, endurance, and vigor to the intellect. These qualities, she stated, are not achieved from the stimulating impact of a complex diet.[28] In my educational setting, about 80 percent of the students are not Seventh-day Adventists; therefore, the scope for health evangelism is excellent. However, careful planning of instructional lessons and activities is required to teach students biblical principles of diet and food.

Conclusion

Seventh-day Adventist schools were established to foster wholistic development in learners. Effective school-based nutrition education is essential to this development. Nutrition education in Adventist schools should teach students how to care for their bodies by practicing healthful eating and other appropriate dietary behaviors. In addition, it should help them understand how God sustains life. King Solomon's advice is still relevant today: "Teach children how they should live, and they will remember it all their life" (Proverbs 22:6, GNT).[29] Adventist homes, churches, and schools have a solemn responsibility to create and facilitate health programs that will help

children and young adults make healthful food choices from an early age and sustain them into adulthood. ✎

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Shondell DeVelde, **MA**, **MEd, MSc,** *teaches social studies, family studies, history, and food and nutrition at Grand Bahama Academy of Seventh-day Adventists (Freeport, Bahamas). She holds an MA in Human Services with an emphasis in health and wellness from Liberty University (Lynchburg, Virginia, U.S.A.), an MEd in Nutrition Education from Framingham University (Framingham, Massachusetts, U.S.A.), and an MSc in Public Health from the University of South Wales (Newport, United Kingdom). Ms. DeVelde is currently studying for a PhD in Health at Liberty University. Her research interests include nutrition education as a cost-effective tool in combatting childhood obesity and developing nutrition-education policies to address childhood obesity.*

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Melodie Anne
Reed Williams

Engineering Your Future:

A Collection of Engineering Resources

What is an engineer? I had no idea until I was a junior in academy. Dr. Jon Cole, a long-time professor at Walla Walla University (then College) in College Place, Washington, came to talk to students at Platte Valley Academy in Shelton, Nebraska, about engineering and then described the program at Walla Walla. On that day, I knew I would be an engineer, and I have been for more than 35 years. Now I teach engineering at Walla Walla University, where it is my privilege to pass on to students the blessing of an Adventist engineering program.

The world has changed since I graduated from the engineering program in 1986, and engineers designed the devices and tools that made many of those changes possible. Engineers solve problems and improve people's ability to function effectively and efficiently. With the expansion of technology, engineers must adapt to better understand the human side of technology. Everyone can benefit from these skills. Currently, K-8 schools in the North American Division (NAD) must meet learning standards for engineering; however, we need standards for 9-12 schools to prepare students for college or pursue technical careers.

Most teachers haven't been trained in engineering, so this is a big task. Finding resources to teach engineering can seem overwhelming. Here are some suggestions to help you get started.

What Is Engineering?

Engineering is problem-solving in a disciplined way. Engineers take science, math, psychology, sociology, and other classes containing knowledge that they can use to make the world safer, more comfortable, and more entertaining for humans and God's other creatures. The National Science Foundation (NSF)'s video *What Is Engineering?* is a good introduction.[1]

What Makes Good Engineers?

I have observed that good engineers share common characteristics such as persistence, curiosity, and a desire to make things better. They have learned problem-solving, science, and math, how to work in teams, and how to learn from mistakes—both their own and others.

What if Students Think They're Not Good at Math?

"The path to engineering success is through mathematics."[2] Students need a solid mathematics and science foundation before entering college to succeed in engineering. However, "The idea that some folks are 'math people' and some are not is a myth that pervades Western society. This damaging idea has been challenged in recent years by neuroscience showing that mathematics is a subject, like all others, that is learned through hard work and practice."[3] Researchers have found that "By the time students are in high school, they have already made implicit decisions about pursuing or not pursuing advanced mathematics and science courses, and these choices are determined by earlier success."[4] At all levels, we can push back on the idea that math ability is innate. Persistence is key to becoming an engineer, especially for girls and students in underrepresented groups.[5]

Where Does Engineering Fit Into the Curriculum?

Since we live in an engineered world, engineering can fit into many parts of the curriculum. The ethics and effects of engineering are important in even more

content areas such as history, communication, ethics, and learning to collaborate. This article provides some resources for including engineering in specific parts of the curriculum.

History and Engineering

We know little about early engineers, yet we can see the results of their work. As well as being a great Scrabble word, *qanat* is an underground canal that brings water to fields for irrigation. UNESCO listed the Persian Qanat on its World Heritage List under Outstanding Universal Value.[6] Their web page (http://whc.unesco.org/en) has many resources on the qanats and other engineering projects.

We know the person who invented locks: Ch'iao Wei-Yo in China.[7] The locks became more useful after a well-known engineer, Leonardo da Vinci, invented an improved lock gate that we still use today.[8] We think of da Vinci as an artist, but he was known more as an engineer during his lifetime. Both art and engineering were combined in the entertainments he directed. These were like the productions Disney does today.[9]

There are numerous examples of art combined with engineering. From beautiful cathedrals and bridges to ornate architectural designs of transportation hubs, cityscapes, and other structures (i.e., the Eiffel Tower, St. Louis Arch, or structures that become synonymous with a specific place), engineers are consistently integrating art with science, technology, art, and mathematics (STEAM) since these areas go together well.[10]

Engineering, Communication, and Teamwork

The construction of the Israelite sanctuary in the desert combined engineering, communication, and teamwork. God gave Bezalel and Aholiab the ability to design and to work metals, wood, and jewels. The two of them could not have completed the sanctuary alone in their lifetimes. Fortunately, God also made them able to teach others.[11] With their leadership and teamwork, the job was completed quickly.

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Today's engineers work almost exclusively in teams. The jobs are too complex for any one person to do alone. Many engineering faculty use a set of tools from CATME.org (named after its first project, Comprehensive Assessment of Team Member Effectiveness) to assign students to teams, teach them to evaluate the effectiveness of their teams and members. Researchers have extensively validated these tools for use in engineering classrooms.[12] More recently, Ferguson, Ohland, and Cao found indications that CATME may work in K-12 classrooms.[13] The research underlying the CATME tools found five main categories of teamwork skills:

- *Contributing to the team's work* is the ability to add value to a team's work/project.
- *Interacting with teammates* refers to the way individuals communicate within their teams.
- *Keeping the team on track* (timekeeping) and identifying and measuring the completion of goals at each stage of the project.
- *Expecting quality* means working collaboratively to produce the best possible team outcomes.
- *Having relevant knowledge, skills, and abilities* refers to the basic knowledge of individual team members and ways of developing those skills, if lacking.[14]

These skills can be taught and practiced separately from engineering as well as in engineering projects. In the past five years, my students come to our program with better teamwork skills than students when I started, so I appreciate the education they received in elementary and secondary school.

Engineering and Ethics

Engineers can do amazing things. They can use their abilities for the good of everyone. However, from the Tower of Babel to weapons of mass destruction to computer viruses and malware, engineering has been used for evil. Engineering associations such as the National Society of Professional Engineers (NSPE) have developed codes of ethics for their members to follow. These codes vary in their details, but this statement from the NSPE Code sums them up well: "Engineering has a direct and vital impact on the quality of life for all people. Accordingly, the services provided by engineers require honesty, impartiality, fairness, and

equity, and must be dedicated to the protection of the public health, safety, and welfare."[15] Younger students may not be ready to grapple with some of the complex ethical issues engineers can face, but at every instructional level, engineering must be taught with the philosophy that upholds the strict requirement to prevent harm to anyone.

General Engineering Resources

The NSF provides various resources for teachers, students, and parents on its website, tryengineering.org,[16] which is updated frequently with new resources for teachers, students, and volunteers. You can often find local engineers who will be happy to visit your class or host a field trip. Usually, you know someone who knows an engineer. If not, looking online and at local news stories can help you find engineers to ask.

Engineers on YouTube also create excellent resources. *Practical Engineering*[17] is by a civil engineer who provides content dealing with bridges, roads, water, buildings, and related things. *Engineering Explained* focuses on how cars work. *Real Engineering* provides, as their tagline states, "interesting answers to simple questions." There are many more, but these are the top three that kept my son interested. More engineering resources are only a web search away. Enjoy learning and teaching about engineering!

This resource has been peer reviewed.

Melodie Ann Reed Williams, MSCE, *is a Professor of Engineering in the School of Engineering at Walla Walla University in College Place, Washington, U.S.A., and an EdD student at the University of North Dakota. She earned her Master of Science in Engineering from Washington State University and a Bachelor of Science in Engineering from Walla Walla University. Prior to teaching at Walla Walla, she worked as a consulting civil and environmental engineer, and with the Washington State Department of Ecology, Nuclear Waste Program, and Water Quality Program. Professor Williams is a member of the American Society of Engineering Educators and Engineers Without Borders.*

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Editorial *Continued from page 3*

to be."[4] She closed this chapter with the observation that the more we strive toward this goal, the more we will ask ourselves: "Who is sufficient for these things?" Indeed, the task is mammoth, the call sobering.

As a Christian educator, I believe that to teach who we are, we must intentionally nurture our spiritual growth as diligently as we nurture our professional growth. Palmer sums up this process by saying, ". . . good teaching comes from the identity and integrity of the teacher."[5] We are the living examples of what it looks like to follow Jesus that our students and those with whom we interact daily.

And ultimately, this is what Adventist education seeks to accomplish. Adventist education, at its foundation, is about introducing Jesus to all who come within the walls of our schools. In the book *Educating for Eternity*, George Knight emphasizes that "[t]he primary aim of Christian education in the school, the home, and the church is to lead people into a saving relationship with Jesus Christ."[6] To engage wholeheartedly in teaching who we are, we must first know who we are in Christ and allow the transformation to take place in our own lives daily. And from this experience, we offer the same opportunity as we write curriculum, deliver instruction, plan assessments, manage staff, create budgets, implement policies, initiate schoolwide plans, and many other teaching and administrative tasks.

Called to Trust in Divine Power

Thankfully, we have promised assistance. We do not do this alone. Jesus said, "'No one can come to me unless the Father who sent me draws them'" (John 6:44). Paul captured this sentiment by reminding us that without the life-transforming love that comes from God, we are but "a resounding gong or a clanging cymbal" (1 Corinthians 13:1). Words matter, but ultimately, the transformation comes from what God does in each heart to transform our characters into a reflection of His. We have a limited, temporal vision of how our lives will impact the lives of others: "for now we see only a reflection as in a mirror" (1 Corinthians 13:12). For this reason, "we fix our eyes not on what is seen, but on what is unseen, since what is seen is temporary, but what is unseen is eternal" (2 Corinthians 4:18). We have everything we need to do the work Christ calls us to do (2 Peter 1:3, 4).

The articles in this issue present various aspects of Adventist education. Each one makes a difference in students' lives in our schools and even after they leave.

- Kathleen Forbis et al. examine the influential role mentors can have in the teaching lives of beginning teachers. A well-mentored teacher will likely remain in the profession and impact students' lives positively.
- Richard A. Sabuin and John Wesley Taylor V explore the essentials of creating a spiritual master plan and offer a guide for doing so. The guide is already used on Adventist college and university campuses and in many secondary schools and can be readily adapted for primary schools.
- Glynis Bradfield and Ray McAllister address the role of character and integrity building in promoting strategies to maximize academic integrity in the online learning environment.
- In the Best Practices at Work feature section, Shondell DeVelde explores the value of nutrition awareness.
- The three remaining articles continue our emphasis on STEM. Ryan T. Hayes and D. David Nowack explore the use of chemistry to bolster Adventist science education and knowledge of God's creation. Katherine Koudele tackles the proverbial "blueprint" for Adventist education from the agricultural perspective, and Melodie Anne Reed Williams provides a collection of engineering resources that can be used to build STEM awareness.

We hope the articles in this issue stimulate your thinking about the profession and inspire innovative approaches to planning content and improving instruction, and to doing so with faith and learning as the foundation.

Faith-Ann A. McGarrell, PhD, *is the Editor of* The Journal of Adventist Education®. *She can be reached at mcgarrellf@gc.adventist.org.*

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