

Scholarship and Faith: Insights from My BYU Experience

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Not that many weeks ago, I found myself on the phone with the BYU advancement vice president, Keith Vorkink. In that call he invited me to give the devotional today. This was a surprising, completely unexpected invitation, but I nonetheless agreed. After I got off the phone, feeling a bit out of sorts, I glanced at my computer, planning to message my wife, Shannon, about the interesting development. The date on the calendar caught my eye: April 1. Was this actually some kind of elaborate April Fools' joke? Well, as you can see, I am here on the stage this morning, so I am not certain who got pranked.

If you go to my BYU website to find out about what I do for research, here is what you will read: "A common theme in Woolley Lab research is the interrelationship between biological molecules and miniaturization."¹ This is something we have been working on for quite a long time, as you can see from a digital adaptation of an overhead transparency that I used for the job talk I gave at BYU back in 1999, which illustrated what my research

focused on at that point. [A slide illustrating the interrelationship between biological molecules and miniaturization was shown.] (For context, overhead transparencies were the dominant technology for showing images in the classroom in the 1980s and 1990s.) In simple terms, what my research focus means is that we make and use really small tools that chemists, other scientists, engineers, and maybe even doctors might care about.

With the right audience, when I present my research I sometimes include the following scripture as justification for my scholarly pursuits: "By small and simple things are great things brought to pass" (Alma 37:6). You, of course, know that this verse is about how the preservation of a scriptural record helped to move forward God's work. But the more literal, attempted-humor misinterpretation of that scripture that I use in the research context is that my pursuit of miniaturization can also lead to great things.

Humor aside, this introduces the premise of my remarks today—that there can and should be

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bidirectional connections between my scholarship and my faith. This is at the core of the Aims of a BYU Education, which states the following:

BYU seeks to develop students of faith, intellect, and character who have the skills and the desire to continue learning and to serve others throughout their lives. These are the common aims of all education at BYU. Both those who teach in the classroom and those who direct activities outside the classroom are responsible for contributing to this complete educational vision. . . .

. . . A BYU education should be (1) spiritually strengthening, (2) intellectually enlarging, and (3) character building, leading to (4) lifelong learning and service.²

This connection between scholarship and faith is especially clear in the first two aims—to be spiritually strengthening and intellectually enlarging. In the world, these two concepts are often thought to be at odds, but it is my experience that they can exist in harmony. So over the next twenty minutes, I plan to elaborate on three eternal spiritual principles that I have seen reinforced through my experiences as a faculty member and a scientist at BYU:

1. We can advance through continued, imperfect effort as we repent and rely on the power of Christ's Atonement.
2. We should give careful, proactive attention to detail and use our agency wisely.
3. We are neither confined nor defined by our present circumstances, as Christ can "make weak things become strong" (Ether 12:27).

Rely on Christ's Atonement

For most of my career, I have carried out research using microfluidics. Our microfluidic devices are designed, miniature, liquid-carrying structures that can be used on very small samples to speed up chemical processes or detect molecules indicative of human health. During the past decade, I have been collaborating with Gregory P. Nordin, an engineer and a professor at BYU, to develop better ways to make and use microfluidics. Our approach involves 3D printing, and Greg and his students have designed and created 3D

printers that make this possible. A key enabling feature of 3D-printed microfluidics is that we are able to significantly reduce the time spent in the repeated designing, testing, and refining stages to improve microfluidic devices.

In our 3D-printing approach, we start with a digital design file to rapidly 3D print a device, and then we evaluate the device experimentally. From those initial results, we can refine the design, create new 3D prints, and carry out further experiments that advance the field.

Let's break this idea down further. We intentionally design and carry out experiments that we know have a low likelihood of success. On the surface, that doesn't sound like a recipe for progress. In fact, it sounds like a great way to pursue failure. However, what makes our approach powerful is that we learn from each experiment and each mistake to improve subsequent studies and address those failures. This allows us to move forward with each successive experiment and eventually create better systems.

This concept of making gradual improvement by learning from mistakes and failures is both positive and powerful because it can facilitate growth. I think all of us have experience in attempting to do something many times and failing but slowly getting closer to the goal and then eventually succeeding. This principle is general and applies in various aspects of life.

However, we can also view advancement by continued, imperfect effort through the eye of faith. We all make mistakes. Romans 3:23 says, "For all have sinned, and come short of the glory of God." On our own, we can try to do better after each error, and we can improve, but how, for example, can we heal physical, spiritual, or emotional harm we may have caused to ourselves or another person through our mistakes? Is it possible to get a redo?

In my general chemistry classes, I allow the equivalent of a redo by replacing the lowest midterm exam score with the weighted average of the other midterms and the final exam. Yet for most mistakes—particularly for the ones that inflict the deepest hurt—life has no equivalent redo option. However, through the grace and Atonement of Jesus Christ, all our mistakes can be corrected. It

is possible for every human to repent—to change, as President Russell M. Nelson has so ably taught.³ When we repent and turn to the Savior, the consequences of our mistakes are taken away by Him who “surely . . . hath borne our griefs, and carried our sorrows” (Isaiah 53:4), allowing both us and whomever we may have hurt to become whole again.

I am grateful for the amazing grace of Jesus Christ for saving “a wretch like me”⁴ and allowing me to become better through continued, albeit imperfect, effort. I am likewise thankful to have received a greater understanding of eternal truths regarding repentance and Christ’s Atonement through my scholarly endeavors, as set forth in the first two aims of a BYU education—to be spiritually strengthening and intellectually enlarging.

Use Your Agency Wisely

As a further example, let’s talk about another eternal principle—the wise use of agency—and how this principle has helped me in teaching one of my classes. My field of expertise, analytical chemistry, is a precise discipline. More than one hundred years ago, the first American to win a Nobel Prize in Chemistry, Theodore William Richards, was an analytical chemist. Dr. Richards was recognized for determining the masses of elements in chemistry’s periodic table with a precision of about one part per million. That is equivalent to knowing the distance from here to a specific location in Southern California within one yard in the pre-GPS and precomputer era. It is pretty amazing!

One of my favorite classes to teach is Chemistry 227, the introduction to analytical chemistry. I love this class because I get to spend six hours a week in the lab helping students learn about chemical analysis. However, the first time I taught Chem 227 as a brand-new faculty member was not my finest moment as a teacher. I am really thankful that this was way before Rate My Professors was a thing, so the brutally honest feedback from my students did not make it into the digital realm.

One of my greatest challenges was in communicating to students how to become effective laboratory scientists. Chem 227 requires careful planning and thoughtful attention to a host of

possible factors that if not properly addressed will lead to poor results. It has been long enough that I no longer remember the exact aha moment, but I do know that I made an important change to the laboratory instructions between the first time I taught Chem 227 and the second time.

The inspiration for that change came from the conclusion of a prophet-leader’s message to his people. King Benjamin said:

But this much I can tell you, that if ye do not watch yourselves, and your thoughts, and your words, and your deeds, and observe the commandments of God, and continue in the faith of what ye have heard concerning the coming of our Lord, even unto the end of your lives, ye must perish. And now, O man, remember, and perish not. [Mosiah 4:30]

This scripture teaches us the gospel principle of using our agency carefully to make wise choices. We must be vigilant in recognizing the various ways in which it is possible to allow our discipleship to become sidetracked. As we remember this throughout our lives, we can proactively make wise choices that will help us remain faithful.

I considered how this gospel principle might help my Chem 227 students to be more careful in the lab and thus become better scientists. So at the start of the next semester, for the very first assignment in the class, I added the following direction and discussed its implications for the students’ laboratory work:

*But this much I can tell you, that if ye do not watch yourselves, and your **titrations**, and your **weighings**, and your **pipettings**, and observe the **instructions of this lab calibration handout**, even unto the end of **this class**, ye must **fail**. And now, O man, remember, and **fail** not. (Adapted from Mosiah 4:30, with apologies to King Benjamin.)*

Understanding the principle of wise use of agency in the context of laboratory work as well as its eventual consequences in class can help students become better scientists. Students realize that if they want a good grade in Chem 227, they must prepare and use great care in the various processes of weighing, pipetting, titrating, and

so on. Diligence and caution are not just necessary to do well on the first experiment; careful technique throughout the semester is essential to success and to obtaining a good grade at the end of the semester.

This principle of the wise use of agency matters not only in Chem 227, where careful attention to laboratory technique is essential, but even more so in life. Being watchful of our thoughts, words, and deeds keeps us on the covenant path, but we must make more than a one-time adjustment. Careful watchfulness against sin, continued over time, helps to align our desires with God’s as we choose to follow Him instead of anyone or anything else.

If that outcome feels daunting, remember again the first principle that I talked about: through repentance and Christ’s Atonement, we can gradually improve as we learn from our missteps. Changes in our long-term direction are not always perceptible in the near term, but sometimes when we look back, it is possible to see significant growth or change. As Sister Susan H. Porter said in the April 2022 general conference, “our past and present circumstances do not determine our future.”⁵

Know That Your Past and Present Circumstances Do Not Determine Your Future

I am especially grateful for this truth as it relates to my mission. One of the most widely talked about mission stories in our household is “The Hot Dog Fork.” You see, I had a mission companion with a dishwashing philosophy that was different from mine. His approach was to wait until the clean dishes were all dirty before washing any dishes. I am more of a wash-after-you-use-it kind of person. And so, after some number of times of dishes piling up in the sink and me not wanting to take my turn, I had the great idea to *not* develop charity, patience, or another Christlike attribute in dealing with the situation—or even to have a conversation with my companion about how we should take care of the dishes. Instead, I sequestered one fork that I used for all my cooking purposes. Problem solved: if there were no dishes left for making my lunch, I could fork a hot dog, roast it over the propane hot plate, and

enjoy a delightful feast. It doesn’t take a whole lot of hindsight to realize that my inward-looking solution was not a key characteristic for successful missionary service or, for that matter, just being a member of the human community.

Thankfully, my entire missionary service was not determined by this early stumble. As an example, one evening about a year later, a mission companion and I were visiting a member of our branch. At some point we saw a fire in a field across the street, with flames advancing toward a small building. We raced across the street, found a hose, and hurried to the front of the fire, knocking down the flames just as they started to reach the building. During the previous year of missionary work, as I had taught, served, and learned to love the people of Argentina, I had lost some of that initial one-fork selfishness.

Professionally, I have also seen how past and present circumstances do not have to determine the future. For me, a prominent example of this is writing. I have not always been a confident writer or even a good writer. I got B grades in English in high school. My senior year, I took three AP tests. I was really confident about two of them and, well, less so about the third one—AP English.

When the letter with my scores came in the mail the summer before my freshman year at BYU (and yes, this was in the days of real mail), I was happy about getting fives on two of the tests, but I was absolutely ecstatic about the three that I got for AP English. A three was the minimum score needed to receive college credit, and this meant that I wouldn’t have to take freshman writing. At that point I thought I was done with writing.

Now if you are not already aware, writing is an integral part of being a professor. Much of what I do involves writing, be it writing about my own research, reviewing work from my students, or evaluating others’ writing. Confidence and ability in writing are foundational to success as a professor.

Fortunately I didn’t need to have the writing skills of a professor when I started as a freshman at BYU. I was able to learn gradually and through a number of ways. One thing I realized was that I had developed a fear of writing. I

eventually decided to address that by taking an English class—and not just any course, but one on feminist literature. That class didn't teach me everything I needed to know to be a better writer, but it gave me plenty of practice, and I developed confidence in my writing abilities. I realized that I could write a lot better than I had previously thought, and I did much better in the class than I had initially expected.

Additionally, I received expert guidance from BYU faculty members who helped me improve my writing during mentored research. I also studied good writing, including scientific writing, by reading and trying to understand recently published papers. My doctoral and postdoctoral advisors further mentored me in my writing and gave me many opportunities to practice and improve my skills.

Looking back, I see three general processes that helped me improve as a writer: (1) recognizing a deficiency, (2) seeking expert help, and (3) practicing. Even now I hesitate to say that I am a good writer—I still have some imposter syndrome—however, I am pleased with my writing accomplishments. My students and I have published more than one hundred scientific papers, I have written research proposals that have resulted in obtaining funding to support dozens of students who have worked in my laboratory, and I am even the chair editor for a peer-reviewed scientific journal, a position in which I get to decide which of the hundreds of papers that are submitted every year get published.

Believe Christ Can Make Weak Things Strong

I am profoundly glad that my future was not determined by the writing abilities of my past self. What I learned from becoming a better writer connects to the final gospel principle I want to emphasize this morning:

And if men come unto me I will show unto them their weakness. I give unto men weakness that they may be humble; and my grace is sufficient for all men that humble themselves before me; for if they humble themselves before me, and have faith in me, then will I make weak things become strong unto them.
[Ether 12:27]

If we are to let the Savior make weak things become strong, this verse states two prerequisites: we must develop humility and we must have faith in Christ. I note elements of commonality between these essential steps and the processes that I identified in my quest to become a better writer. I recognized a personal deficiency—in my case, fear of writing. Note that we often recognize weaknesses as we develop humility. I also sought expert guidance. As we develop faith in Christ, we pattern our lives after Him, the ultimate expert and the only perfect soul to live on this earth. It is interesting that personal effort—my third observation about improving writing and an essential element of the two eternal principles I have already discussed—is not mentioned in the process for letting Christ make weak things become strong. This emphasizes the essential role of the Savior's grace rather than our own merits as He makes weak things become strong unto us.

Allowing the Savior to make weak things become strong goes well beyond disciplined self-improvement plans that can help a person get better at something. Even without invoking spiritual laws, almost anyone can increase a particular ability through persistent, focused effort. From my own experience, someone will likely become a better writer by identifying a deficiency, seeking expert assistance, and then practicing. However, the scriptural pathway to make weak things become strong is more than a self-help strategy or a way of developing talents in a profession. It involves letting God prevail⁶ in our lives and enlisting the Savior to make weak things become strong. It is the way to gain knowledge of eternal significance; it is how to create lasting change in our lives. What an amazing blessing it is that the Savior's Atonement enables all weak things of any nature to become strong!

Let's reflect on what I have discussed this morning. I have learned and grown professionally at BYU in a number of ways: through working with students who use 3D printing to develop improved microfluidic devices, by teaching introductory analytical chemistry, and in becoming a better writer.

Those experiences have also provided me with useful life insights: first, the ability to improve

through continued yet imperfect effort; second, the need for careful attention to detail; and third, the possibility of becoming better than I currently am. The unique and synergistic environment of scholarship and faith at BYU has further connected those important life lessons to significant eternal truths regarding repentance and the Atonement of Jesus Christ, the wise use of agency, and Christ's ability to make weak things become strong.

I know that agency is a divine gift from God. I testify that through the Atonement of the Savior, we can repent and have all our wrongs made right and that He can make weak things become strong to us. Jesus Christ is "the way, the truth, and the life: no man cometh unto the Father, but by [Him]" (John 14:6). In the name of Jesus Christ, amen.

Notes

1. "Adam T. Woolley," Brigham Young University Department of Chemistry and Biochemistry, chem.byu.edu/faculty/adam-t-woolley.
2. The Aims of a BYU Education (1 March 1995).
3. See Russell M. Nelson, "We Can Do Better and Be Better," *Ensign*, May 2019.
4. John Newton, "Amazing Grace" (1779).
5. Susan H. Porter, "Lessons at the Well," *Liahona*, May 2022.
6. See Russell M. Nelson, "Let God Prevail," *Ensign*, November 2020.