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Every discipline has a unique vocabulary of terms and expressions that must be understood in order to function properly there in. At times these terms will cross disciplines. It is important to understand the context of the term in order to interpret it correctly. The word stress is an example. Engineers originally defined stress as: a force exerted when one body or body part presses on, pulls on, pushes against, or tends to compress or twist another body or body part; especially : the intensity of this mutual force commonly expressed in pounds per square inch. Psychologists borrowed the term and applied it to a human condition that has become far more familiar to the general public than the first definition: a state resulting from a stress; especially: one of bodily or mental tension resulting from factors that tend to alter an existent equilibrium.

When I came from a biomedical / manufacturing environment to Cedarville University, I quickly discovered that there are some unique terms that I had to come to grips with. Examples include, pedagogy, regalia, forensics, and “the Hill” (I didn’t think Cedarville had any hills). Integration is another one of those terms and the subject of this paper. I became familiar with the concept of a type of integration when I was in primary school in the late sixties. As a Caucasian in Flint, Michigan, I attended Garfield Elementary which was 98% African American, and I was the object of integration. Another type of integration became part of my vocabulary when I studied Calculus. From a Christian educator’s perspective, integration may be defined as the coordination of faith and Biblical truth into all aspects of who we are and what we do and its manifestation in our learning and our teaching. Integration should always lead us to a deeper understanding of God, a drawing closer to Him.

Sometimes the opposite of a word is easier to understand and sheds light on the true meaning of the word. Disintegration is to lose unity or integrity by or as if by breaking into parts. As an engineer, my mind is naturally intrigued by disintegration. Whenever something breaks it becomes an object lesson. I have spent hours studying a broken bit of metal, composite or some other material, sometimes under a microscope. It goes beyond engineering; I would venture to say that intense interest in disintegration is a part of human nature. There is a natural curiosity to understand what went wrong or, why something broke into parts - disintegrated, if you will. There is a natural law, namely the Second Law of Thermodynamics, which states that things left alone will naturally disintegrate. "The second law is based on human experience. It doesn't come from complicated theory and equations. So, think of these experiences that you have had: A rock will fall if you lift it up and then let go. Hot frying pans cool down when taken off the stove. Iron rusts (oxidizes) in the air. Air in a high-pressure tire shoots out from even a small hole in its side to the lower pressure atmosphere. Ice cubes melt in a warm room. What's happening in every one of those processes? Energy of some kind is changing from being localized ("concentrated" somehow) to becoming more spread out" (Lambert). God originally designed man to live forever. It's interesting to consider that "the second law" was somehow different in the Garden of Eden. If disintegration is loss of unity or a breaking apart, then integration is unity or a bringing together.

Disintegration of mankind began in the Garden of Eden. The book of Genesis shares the account of creation. It is clear that God made man in his own image (Gen. 1:27) which distinguishes man from other creatures. The first man, Adam, walked and

talked with God. He knew that everything had come from God and gave all the honor and glory to Him. Adam was fully integrated. Adam realized that God had knowledge that he did not have, which was motivation for him to take fruit from the tree which gave the knowledge of “good and evil”. The result of Adams misguided effort to be like God was spiritual death, bondage, guilt and blindness not only for him, but also for mankind. When sin entered the world, the entire human race disintegrated. It is only by God’s grace, through the redemptive work of Christ, that man can begin the process of re-integration. Certainly, this process will not be complete until “we see Him just as He is, and then we shall be like Him” (1 John 3:2) and will enjoy a state of constant communion.

It seems to me that there were only three individuals that were fully integrated mentioned in the Bible: Adam & Eve before the fall and Jesus. The Bible is replete with examples of godly men and women who approached full integration but “the curse” always interfered. Much of what Paul writes in his epistles is instruction to the early church on how to live integrated lives. Yet Paul acknowledges his own shortcomings in the seventh chapter of Romans as he admits to being “a prisoner of the law of sin at work within my members” (Rom. 7:23). Like sanctification, integration is an unattainable lifelong endeavor and its pursuit is of tremendous value for eternity.

By faith we can recognize that God is the absolute Sovereign of the universe. He is omniscient regarding His world (Ps 139:1-6); therefore, everything that we learn and teach is in God’s domain. God is the source of all truth. He has chosen to communicate His truth to us in different forms. First and foremost, the inspired Word of God, the Bible, is the most important source of truth. It is through God’s direct revelation that we have

the ability to know Him and to begin to understand truth. Secondly, He has revealed truth through His only son, Jesus. The life of Christ was an incredible revealing of pure and perfect truth given to us in a physical form we can understand. Note however, there is truth that Jesus conveyed through His life that the Bible does not contain. The apostle John writes in the last verse of his gospel “Jesus did many other things as well. If every one of them were written down, I suppose that even the whole world would not have room for the books that would be written” (John 21:25). The Bible is a subset of the truth that Jesus revealed to mankind. Thirdly, Scriptures indicate that God reveals aspects of truth in extra biblical contexts. “The heavens declare the glory of God; the skies proclaim the work of his hands. Day after day they pour forth speech; night after night they display knowledge. There is no speech of language where their voice is not heard. Their voice goes out into all the earth, their words the ends of the world” (Psalm 19:1-4). Undeniable examples of God’s divine revelation in my life include witnessing the birth of my children, watching the “undefiled” star filled sky in northern Canada and “field dressing” a white-tail deer. The evidence of God’s handiwork on a micro and macro level is truly awesome.

As God has chosen various ways to communicate truth to us, the acquisition of such truth occurs through various methods. Proverbs clearly communicates that the starting point for wisdom and knowledge is the fear of God (Proverbs 1:7). Proper respect and awe of the Person of God is fundamental to receiving His truths. Secondly, since the inspired Word of God is the most important source of truth, it naturally follows that the acquisition of knowledge comes from intentional and consistent study of the Scriptures as a whole, as well as specific attention to the study of the life and mind of

Christ. Additionally, the existence of extra-Biblical truth requires we search out truth found within the created world around us. Finding such truths should lead us to deeper understanding of the Creator, a drawing closer to Him. Proverbs states “it is the glory of God to conceal a matter, but to search a matter out is the glory of kings” (Proverbs 25:2) and “apply your heart to understanding...call out for insight...look for it as for silver...then you will understand the fear of the Lord and find the knowledge of God” (Proverbs 2:2-5). Clearly, searching for truth (whether within the pages of Scripture or beyond) brings us closer to God because God is the source of all truth. It must be noted here that seeking for truth within the created world and our experience can be undeniably subjective and, therefore, must be evaluated for its validity. In the end, we again return to Scripture as a means to evaluate the accurateness of our human thought and experience. We rely on the Holy Spirit to illuminate truth to us as we “call out for insight and cry aloud for understanding” (Proverbs 2:3).

Jim McMann was striving to live an integrated life when I met him in 1979. I was an eighteen-year-old tool and die apprentice. Jim worked with me at Sherman Tool and Design. I was warned about Jim from the very beginning. My foreman said “He’s one of those Jesus freaks”. Jim shined brightly in the shop. His tool box lid displayed pictures of his wife and kids while the tool box lids of my other colleagues displayed pictures of women that I’m quite sure were not their wives. Jim spent his lunch break reading God’s Word while the rest of us played cards. What attracted me to Jim was the fact that he loved God, had a great sense of humor and he did not have a pious attitude. Our relationship was kindled as we played practical jokes on each other. It wasn’t long before I opened up and started asking Jim some of “the big” questions. As a result of Jim loving

God and trying to make Him central (integrated), God used Jim to usher me into His kingdom. My experience with Jim McMann forged my concept of integration of faith as a professional.

Understanding and embracing integration affects all disciplines, including engineering, because it impacts our thoughts, our motivations, our views of the world, our actions; in fact, there is nothing it does not touch. Whether I am an engineer in industry or an engineering educator, my faith should be integrated in all I do and in all I am. While it may require a bit more thought and intention to incorporate God into a discussion on geometric tolerancing as opposed to a classroom lecture in the Bible department, the more integrated my own life becomes, the more natural it is to bring the awe of God into all I teach. There are, in fact, many ways to integrate faith and learning into my course design, assignments and classroom teaching. The remainder of this paper outlines various methods and specific examples I have used to promote integration into my teaching style.

To begin with, I must remind students that while they are here to “learn engineering” this education is not the end objective but is part of the process of preparing for a lifetime of service. The vocation of engineering is a means to serve God as we seek to further His gospel and kingdom. As well, this service should be done “heartily, as unto the Lord” (Col. 3:23). Challenging students to excellence in their studies is the beginning steps to a lifetime of excellence.

Exodus 35: 31-36 is the portion of scripture that I have at the top of my syllabus for Manufacturing and Finance. “... and he has filled him with the Spirit of God, with skill, ability and knowledge in all kinds of crafts- to make artistic designs for work in

gold, silver and bronze, to cut and set stones, to work in wood and to engage in all kinds of artistic craftsmanship. And he has given both him and Oholiab son of Ahisamach, of the tribe of Dan, the ability to teach others. He has filled them with skill to do all kinds of work as craftsmen, designers, embroiderers in blue, purple and scarlet yarn and fine linen, and weavers-all of them master craftsmen and designers”. I’m impressed with the fact that this is the first instance in the Bible where a man is “filled with the Spirit of God”. I have a passion for design and craftsmanship. That is one reason why I choose to study engineering. I am amazed at how many of our students are in engineering because they are good at math and science but they have never been exposed to the way things are made. In this class, I have the joy of introducing students to many of the creative ways by which things are manufactured. We take tours of facilities that manufacture trucks, boats, airplane propellers, artificial limbs etc. Students come away with an appreciation of the incredible creativity of man which is second only to his Creator. I want to encourage within them a heart for creative thinking and craftsmanship as a way to reflect God’s image.

Similarly, another natural focus of integration in any classroom in the science disciplines is an attitude of awe at God’s creativity as we study the natural order, coordination and beauty of His creation. Jaelyn Barker was born with a partial right arm. Two of my senior design teams created an artificial arm that Jaelyn used to play a violin. Thousands of man hours went into analyzing, modeling and building a device that would mimic the natural motion of the human arm. Though the results were satisfactory from a functional perspective, the man-made arm was vastly inferior compared to God’s design. It is extremely humbling to attempt to mimic something that God has created.

A class project is always a part of the course “Manufacturing and Finance” and I purpose to choose things that are ministry related. For two years we designed and manufactured a carpetball table which is a game that has become a staple at Christian camps. Last year the class designed a special missionary frame. The objective was to create an attractive, vandal resistant picture frame for hanging on “the missionary wall” at a church. The frame also housed prayer letters and prayer cards for missionaries. While the premise for these projects is always design for a consumer product, students can be ministry-minded in the process.

For consumer product design to be successful there must be a very close integration of engineering and business. Without the business component, engineers are inclined to create high tech, ugly, expensive and complicated products that the market has little or no interest in. I try to touch upon business elements in my class by introducing new-product-payback formulas and by teaching the students how to decide if something should be manufactured or purchased (make vs. buy decisions). I also cover topics like return on investment and the time value of money. I know from listening to “Money Matters” on the radio that the Bible has more to say about finances than any other topic. My goal is to help the students understand the principles of stewardship and investing in the context of an eternal value system.

It is said that “more is caught than taught”. While this may at first seem strange to say in an academic environment, when referring to faith integration, I believe it could not be truer. As a professor, I face the tremendous challenge and opportunity to demonstrate Christ-like attitudes, behavior and character to my students on a daily basis. They are, in fact, students not only of engineering, but of what this Christian faith is all

about and how to transition into an adult that honors God and reflects His love and character to the world at large. I remind them, as well, that when they enter the workplace, they also will be watched. I took my Advanced Manufacturing class on a tour of my previous employer, Ohio Willow Wood. I saw my friend Tommy Miller (A.K.A. Bubba) working on one of the assembly lines. A big smile lit up his face as he charged over to greet me. I held out my right hand and he brushed past it, wrapped his big hairy arms around me and hugged me until my ribs creaked. He said, "Jay, I got saved"! As best as I can remember, I never verbalized the gospel to him. But, something about my example at OWW made Tommy identify with me as a fellow brother in Christ. Our students have tremendous potential to impact the world for Christ. It is, in part, my responsibility to send them out prepared.

This preparation process includes incorporating in class discussions practical ways that the students can integrate their faith into the "real world". For example, in a discussion of the importance of honor and respect in the workplace, I will refer to those who have a lot of experience but perhaps not a lot of education. The "behind the scenes" folks, technicians, machinist, administrative assistants, custodians, shipping & receiving, customer service, sales to name a few, are truly the backbone of any organization. Engineering graphics is a freshman level class that I teach. I stress the fact to my students that they are really learning a graphical language by which they will communicate with machinist / production. To assist the machinist in his success, we must present a design on a properly formatted, dimensioned drawing with acceptable tolerances (range of acceptable error). Even better, if possible, is to get guidance from the machinist on how he would like to have the information presented. Communicating in his language

demonstrates that we care about him and we are diligent in our work. In short, we are “loving our neighbor as ourselves” and demonstrating humility and a teachable spirit. Engineering ethics is a relatively easy and yet critically important means of challenging the students toward faith integration into the workplace. For example, in the missionary frame project, when approaching a design from a “making it for profit” perspective, the issues change significantly from the design “just to see if it works”. These issues require a great deal of ethical discernment which challenge students to think Christian worldviewishly (to use a Dr. Bill Brownism). Examples of these issues include: maximizing profit for my employer, making a product that is “safe enough” but not cost prohibitively safe, environmental impact of production, production impact on humanity (child-labor, personal injury, exposure to toxins), ramifications of the end-use of the product (E.G. cigarettes and weapons), recall decisions. Sometimes even benign products are used for evil purposes and raise serious ethical questions. Formula Boats in Decatur, IN is the premiere manufacturer of off-shore speed boats (sometimes called cigarette boats). A potential customer from Miami, FL wants to order an all black boat with the largest possible engine, fastest hull, minimal seating (to maximize cargo), replete with the latest electronic counter measures and guidance systems. They are interested in paying cash for this boat. The designers at Formula are in a quandary. It’s hard to turn down an opportunity to make a tremendous profit and the boat would be a lot of fun to design. Yet it is painfully obvious that it would be used for amoral purposes. These are the kinds of dilemmas that our students will face. My prayer for them is that they would be able to integrate their faith and convictions so that they can make decisions that glorify God.

This naturally flows to perhaps the most exciting aspect of faith and learning integration as a professor – the many mentoring opportunities that naturally occur as relationships develop over time. From the transition freshman face from “being on their own” to seniors who are often in midst of making some of the biggest decisions in their lives, we have so many opportunities to come along side and listen, encourage, challenge and role model God honoring choices and attitudes. I particularly enjoy having students into our home for meals or just to “hang out” and play or project with me. Students are generally highly interested in picking up tips from a healthy marriage. I believe Andrea and I give them that opportunity. It’s common to have them jumping on the trampoline, playing with our kids, firing a potato cannon or working in my shop. I treasure opportunities to share my life as a craftsman, outdoorsman, father and husband. Through mentoring and role modeling, I hope to be better preparing my students to live wholeheartedly for Christ; that is, an ever-increasingly integrated life.

Pastor Chad Coe from Grand Rapids Michigan was a guest preacher at our Church last November. He made a statement in his message that captures integration: “when you accept Christ as your personal savior He doesn’t become part of your life, He becomes the whole deal”. It is my sincere hope and prayer that my own efforts to be “integrated” personally and to teach in an integrated fashion will encourage my students in their pursuit of Christ becoming the whole deal.

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