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Algebra Anyone?

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"Solving life's problems is rather like the process of doing algebra. Time, skill, wisdom, and determination are necessary keys for success in both endeavors."

INTRODUCTION BY TED PANITZ

Every once in a while a student does something that makes teaching exhilarating. Those moments underscore the whole purpose of teaching. I would like to share one of those with you that I had recently.

Leslie started college last September as a returning student having raised a family and worked at part time jobs. She had all the symptoms of a person unsure about the world of college, a completely new experience for her: high anxiety, low self-esteem, and lots of self doubt. She started in my elementary algebra class and is now completing intermediate algebra and is ready to take on college level math with a great deal of confidence.

Leslie responded to my precourse letter of introduction, where I ask students to write their math autobiography before coming to the first class, by writing a three page essay. Most students write one page double spaced, if that. She indicated that she appreciated the opportunity to write to me since she understood that form of expression while she couldn't comprehend math concepts. She responded to all my writing assignments with enthusiasm and often mentioned how they helped her through the course. Throughout the course she, along with many of her peers, kept asking the eternal question, "What do I need this for???" My response was always that it would help her in life. That usually brought guffaws and giggles from ev-

eryone.

This week, Leslie approached me right before class and said she had something special for me. "Uh oh! What could that be??!" I wondered. She wrote an article for our school's literary book, "The Write Stuff," which is refereed by faculty, and her article was accepted. Let me tell you this is one proud student and one proud teacher. You will see why in a moment.

Leslie has captured the essence of why anyone should take classes at college. Her inspiration happens to have come through her experiences with algebra. She has made a few good friends through our classes and has learned a lot about herself. I have had the privilege to watch her grow and develop into a mature college student. I attribute her response in large part to her adapting to and using cooperative learning and a mastery approach to testing in a supportive, non-threatening environment which was created by collaboration instead of competition.

Leslie has given me permission to duplicate her article for my other classes and to send it out over the Internet. If you feel it might have an impact on some of your students, feel free to use it.

This student's response will keep me humming and smiling down the corridors for some time.

ALGEBRA ANYONE?

When an elementary algebra class is in progress, repeated choruses of "Why do we have to take algebra anyway?" can be heard echoing down the college corridors. I was an avid member of this chorus in the early weeks of DE060 (Elementary Algebra) while struggling to get my aging brain to grasp the basic concepts. But, as my ability to handle algebraic complexities increased, I gradually became aware of the benefits of algebra. They have little to do with the

usefulness of any particular math skills and formulas in the future and more to do with the reality that solving life's problems is rather like the process of doing algebra. Time, skill, wisdom, and determination are necessary keys for success in both endeavors.

The effort of gaining skills and solving problems, whether in life or algebra, often takes a sizable investment of time and energy. Adequate time does not

magically appear in the crowded schedules of the late 20th century lifestyles; it has to be carved out, sometimes ruthlessly. New priorities have to be established, if only temporarily, and ways of using time more efficiently will have to be discovered in order to accomplish everyday chores more quickly. But first and foremost, finding time to learn skills and solve problems depends on a willingness to invest the required time and determination to give whatever it takes to accomplish the goal at hand. Some of life's problems hardly seem worth this investment, just like algebra. Doing so anyway increases discipline, focus, and understanding for those times that are critical.

Not only is it necessary to gain knowledge and skill to effectively solve problems, but wisdom is also needed to decide which option to choose and when. I have often thought about this when confronted with setting up and solving an equation or simplifying an algebraic expression, especially one that contains a complex fraction. Invariably, I forget to keep track of the signs or fail to remember the rules that govern them, and so I arrive at an incorrect solution. There are so many questions to ask of myself and many that I forget to ask. Have I reduced or factored enough? Is it

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even factorable? Sometimes I forget to factor altogether or forget that eliminating fraction denominators anywhere but in an equation is not allowed. I love to get rid of those irritating fractions. When working on a personal problem, I have often pictured a complicated polynomial expression in my mind's eye and

RESPONSE BY WALTER BURLAGE

Thank you for passing along that student's essay regarding the importance of algebra. I have felt this way about algebra for a long time myself, but I find it difficult to communicate those feelings to my students. Usually they do not want to believe that doing well in algebra is going to have some future benefit. It is taken (by them) a little bit like the promise of organized religions (i.e., adhere to these beliefs, live according to these principles, and you shall be rewarded somehow). But when the message comes from a fellow student, it may have some added credibility.

the confusion of all the rules, terms and variables involved in simplifying it. When I think of an equation, I am reminded of balance as I remember that what is done to one side of the equation must be done to the other. Balance is a good thing to keep in mind when solving problems. I don't always get my solutions right in life or in algebra, but the more I practice and understand my mistakes, the more my wisdom and skill improve. This is most definitely an advantage.

Finally, algebra is a wonderful opportunity for strengthening determination and self-confidence, valuable character traits when faced with a problem. It is the only academic subject I have taken where it is possible to gain some degree of understanding and confidence only to turn the page to the next chapter and not have the slightest idea about what the text is trying to explain. This is disequilibrium . . . "BIG time." At its worst, disequilibrium involves fear of the unknown, of not knowing the right way. At best, it is simply confusing and frustrating. Either way, the temptation is to avoid it rather than gather up the courage and patience to stand up on one's potential and trust that eventually the light will dawn. I can foresee that pushing through the dark chapters in algebra will help when the dark chapters of life occur, problems for which past experience has not been adequate preparation.

After satisfying the math and science requirements for a degree, it may be true that I will never again use the particular math skills I have learned along the way. I will not, however, consider the investment of my energy a waste of time. The reward of improved discipline, skill, wisdom, and determination will be useful keys of success for the rest of my life, especially when confronted with the "impossible."

I would like to share my story with you and I hope that you will pass it along to Leslie. When I completed the requirements for a B.S. degree in 1970, the Vietnam conflict was going full tilt. A friend told me that joining the U.S. Marine Corps Reserve was a way to fulfill my military obligation and probably avoid going to Vietnam. Just one small hitch, however, was that I had to undergo six months of active duty training (boot camp and beyond) with regular Marines. Little did I know that this was about to become one of the greatest challenges of my life.

When I arrived at Marine Corps Recruit Depot, San Diego, CA, I was treated like all of the other poor slobs who had chosen the Marine Corps as their way to fulfill their military obligation. I felt very intimidated at first because I was not sure whether I could handle the physical challenges (running all day, carrying a 30 lb. pack and a 14 lb. M-14 rifle). I knew that most of the other recruits were younger than I and in much better physical condition.

Imagine my surprise when I discovered after a few short weeks that not only could I keep up with the physical challenges, but I was surpassing most of the younger recruits. It took me a while to figure out why this was so. I could not immediately see any logical reason why this was happening. Later, when it finally dawned on me, I had difficulty believing the truth that I had discovered.

The truth that I discovered is that Marine Corps Training, while it is extremely demanding physically, is also demanding both emotionally and psychologically. The Marine Corps, after all, is attempting to train its people to go into the worst of situations (a battlefield where an adversary is trying to kill you, where you may be outnumbered and out-gunned, where there is seemingly no hope . . .) and function as a soldier to the best of your ability. When this emotional/psychological

element is added to the physical challenges, the training can rapidly become more than many young men are able to endure and they break down. First, they break emotionally and then they break physically. If your head is not in the right space, all of the physical strength in the world will not pull you through.

The Marine Corps drill instructors are trained to break recruits emotionally first. They know that they have succeeded when they begin to see the physical breakdown. Once this occurs, they then begin to rebuild the recruit emotionally to prepare him to survive the reality of warfare. Once the emotional component is back in place, most recruits quickly regain their physical powers.

I discovered through this experience that all of the mathematics I had studied had actually prepared me to face the "impossible." I already had acquired the emotional discipline that carried me through those harried few weeks of boot camp. It sustained me and carried me through that terrible, nightmarish experience. As I look back on my life, I can recount other times when the discipline that I learned in mathematics truly came to my aid when I was faced with a difficult life challenge, but few events will compare with my experience in the Marines.

Mathematical Rebuses

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