

E = mc² - Power for Classroom Teachers

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Physics in the early 20th Century was dominated by the brilliance of Albert Einstein and his amazing discovery of $E=mc^2$, the simple sounding formula which few understand (Mamedov & Esmer, 2014). “E” stands for energy, “m” is for mass, and “c” is the speed of light at 186,000 miles per second which is multiplied by itself in the “squared” function. The speed of light squared is an incredibly large number, representing where the power of the formula is located. Essentially, what Einstein was showing is that energy and mass are interchangeable, which explains the loss of energy and mass in radioactive material.

As an educator and high school science teacher, I was struck by the idea that there was another similar formula that is applicable in education, using the same letters:

Educational outcomes = **M**ethodology and curriculum x **C**ompassionate love²

This formula requires a bit of unpacking for full understanding.

Educational outcomes (E)

“Educational outcomes” or “student outcomes” are phrases that are much bantered about in educational circles, but may mean different things to different people. “When investigating or reporting on student outcomes, it is important to determine precisely how the term is being defined in a specific educational context (Partnership, 2013). The phrase invites the question, “What is a positive educational outcome?” and “How do we know what negative outcomes looks like?” Making a list of the positive may look like:

High student grades

Improved skill set

Increased ability to analyze and evaluate new situations

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Advance in attitude toward being a responsible member of society

Increased ability of working with others in a team effort

Development of an attitude of a life-long learner

The formation of a curious, inquiring mind

A positive sense of self-worth and respect for others

A focus on gratitude and sense of self-given for the benefit of others.

Improved graduation rates and matriculation into four-year college/university programs.

Negative Educational Outcomes may be:

“Low or declining test scores,” (Partnership, 2013)

Loss of focus in class

Low graduation rates and employment in mediocre, low-paying jobs (Ferguson, Bovaird, & Mueller, M. 2007).

Regression of skill sets

Anti-social behavior

High student anxiety rate

Self-harm and suicide

With each of these positive and negative outcomes, there will be variations and degrees of differences between individual students. Each of these outcomes could be quantified and used as a general measure of student success or failure in school. Obviously, any well-intended teacher hopes for high positive child development, minimizing negative behavior patterns.

Methodology and Curriculum (M)

Methodology and curriculum are two halves of the same coin. The content of curriculum a teacher learns at the university, are the facts about their course of instruction. The English

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teacher most likely majored in English, the science teacher in science and physical education teacher was probably an active member of various sports teams before entering a teacher induction program. Each teacher is assumed to be a subject matter expert as they enter the School of Education for the formation process to become employed as a teacher. In many states, teacher candidates must pass a test to certify this knowledge base.

Methodology is the art of delivery and classroom management the teacher will need daily to convey their knowledge to students and to facilitate student learning. It is a generalized truth, that most new teachers teach as they were taught in their youth. But methodology is, in fact, a very complex interplay of classroom personalities, theatrics and control of the students' environment to maximize learning. Done well, students may know little about the techniques and nuances of how they are being taught. Nonetheless, the astute teacher is constantly turning the knobs and flipping the switches of the educational machine they have created in their own classroom. Good teachers/facilitators will change their mode of delivery or arrangement of topics in a heartbeat if they find a better way of doing something. The art of successful methodology would take volumes to adequately document, but suffice it to say that it does not happen by accident and is an important factor in developing positive educational outcomes.

Compassionate Love Squared (C²)

“Love” is not a word often used in educational circles because it is so misunderstood and people usually apply the worst interpretation to your words. I will, nonetheless, throw caution to the wind, and bring our hearts' intents into focus. Any good teacher will connect with the idea that they are teachers because they love what they are doing, and by extension love working with kids. It is also true that by doing a good job and giving each child our best, we are also loving them in the most wholesome sense of that term. Some of us view the care we give to our

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students like the love and care we give to our own children or grandchildren. We call them “my kids” in the staff lunch room and though we know they do not belong to us, we have an investment in their lives, an investment that will affect their entire future.

“Compassionate” is an important modifying adjective, because of its word origin meaning “to suffer with.” We can understand our students, know the tensions experienced at their stage of life and relate to the stress of homework, tests and social relationships. We need to find that balance that keeps us away from becoming their buddies on one side or their slave drivers on the other. We need to suffer with them, join in the battle raging around their lives, yet stay one step removed as professional teachers. This came home to me today when an eighth grader told me how sad and unhappy she was. She did not like herself and showed me her left forearm, covered with fresh, self-inflicted cut marks. Suddenly I had a child in danger and immediately got the vice-principal and counselors in the loop, telling her I needed to get her help so she would never do that to herself again. I am now suffering with her, praying for her safety and healing, trying to find simple ways daily to build her up.

The compassionate love is “squared,” amplified exponentially in the lives of our students as we find ways of acknowledging their worth and importance. As we find ways of building up our students, showing them the wholesome love that only a teacher can give in the normal course of school life, we recognize our students’ confidence building. As we gain their trust, students will often open their lives so we can see their joys, delights, fears and anxieties. As the ancient proverb states, “A word fitly spoken is like apples of gold in pictures of silver” (Proverbs 25:11, Bible Gateway). With the doorways open, we can speak those golden words into their lives with care and concern. Once a student knows you care, then the curricular learning flows freely. So, when you are asked “What is your super power,” you can readily respond, “I teach!”

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Summary

Educational outcomes = **M**ethodology and curriculum x **C**ompassionate love².

Positive educational outcomes are the product of superior methodology and knowledgeable curriculum times compassionate love squared. Poor educational outcomes occur when a teacher is incompetent in the knowledge of their topic, and/or has inferior methodology or lack of love for students. Poor methodology can sabotage prepared curriculum, and the reverse is also true. Large amounts of love will not overcome poor methodology or ill prepared curriculum, but it can turn an average teacher into an extraordinary one to the benefit of their students. Positive educational outcomes are a balance of all these factors

References

- Ferguson, H., Bovaird, S., & Mueller, M. (2007). The impact of poverty on educational outcomes for children. *Paediatrics & Child Health*, 12(8), 701–706.
- Mamedov, B. a., & Esmer, M. y. (2014). On the Philosophical Nature of Einstein's Mass-Energy Equivalence Formula $E = mc^2$. *Foundations of Science*, 19(4), 319–329.
<https://doi.org/10.1007/s10699-013-9339-6>
- Partnership, G. S. (2013, October 14). Student Outcomes Definition. Retrieved April 13, 2018, from <https://www.edglossary.org/student-outcomes/>
- Proverbs 25:11 - Bible Gateway. (n.d.). Retrieved April 16, 2018, from <https://www.biblegateway.com/verse/en/Proverbs%2025%3A11>