# Laughter and Learning

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### Introduction

In overview, this article examines the role of laughter in efficacy in learning by discussing its physiological and psychological effects on student ability to learn and its intrinsic psychological motivations in the process of learning. Peer-reviewed literature is surveyed as an underpinning of a pedagogy of laughter for enabling students with instructional manner and teaching method towards an efficient cycle of learning, and for measuring and improving it.

Why laughter? "There is no greater weapon in a director's arsenal than a strategically placed song" (Will Ferrell, Jack Black, Oscars, 2004).[1] It's funny, maybe a bit painful, as you have this earnest planning and execution affected powerfully in mood by something seemingly tacked-on. However, it is integral to the situation whose efficacy it either creates or destroys. For learning and teaching, laughter is that "strategically placed song", a catalyst integral to effectiveness in the learning cycle. Gelotology, from the Greek $\gamma\acute{\epsilon}\lambda\omega\varsigma$ gelos, is "the study of laughter and its physiological and psychological effects on the body. Its proponents often advocate induction of laughter on therapeutic grounds."[2] Laughter is a language; it is as fundamental as a gesture; it comes before words. Black and Yacoob (1995) codified laughter as a distinct universal expression having a universal meaning.[3] In the relationship between instructor humor and students' second language learning, Ziyaeemehr et al. (2014) state, "Humor is an integral component of any language and therefore has an impact on the way languages are acquired/learned."[4] Lowman (1995) describes two relationships as the most important in higher education learning — the engagement of the student in the learning process and the teacher-student connection.[5] Berk (1998) says that humor benefits both of these.[6] Strean, in *Evolving towards Laughter and Learning* (2008) builds on this to say that a sense of satisfaction in the student and the bond between student and teacher both benefit from humor.[7] Laughter also plays a role in satisfaction and bonding of students with each other.

This article is presented in 5 sections. （A） In preparedness for learning there are physiological and psychological issues mediated by laughter. （B） In the classroom, where the lesson is executed, problems are compounded. Here, the role of laughter is discussed in terms of teaching method and manner, and the engagement of the student. （C） A pedagogy of laughter bonding teachers and students is described in terms of creating an environment and state of mind students need, and maintaining and enhancing it. （D） A third important relationship in the classroom is discussed as students support each other's intrinsic motivation. The discussion touches on implications for teacher self-efficacy and ways of transforming the lesson. （E） Ways of measuring and improving efficacy of laughter in learning are discussed.

（1） Oscar®. （2004, February 29）. *Jack Black and Will Ferrell "Get Off the Stage" Oscar® song* [Video file]. Retrieved 2018, October 19 from https://youtu.be/NoXLu9Rz70g?t=9.

（2） Wikipedia contributors. （2018, August 2）. *Gelotology* [In Wikipedia, The Free Encyclopedia]. Retrieved 2018, October 19 from https://en.wikipedia.org/w/index.php?title=Gelotology&oldid=853142823.

（3） Black, M. J., Yacoob, Y. （1995）. *Recognizing Facial Expressions under Rigid and Non-rigid Facial Motions using Local Parametric Models of Image Motion* [pdf]. Retrieved 2018, October 19 from http://cs.brown.edu/research/pubs/pdfs/1995/Black-1995-TRR.pdf.

（4） Ziyaeemehr, A., Kumar, V. （2014, January）. *The Relationship between Instructor Humor Orientation and Students' Report on Second Language Learning.* International Journal of Instruction, v7 n1 pp. 91–106. ISSN-1694-609X.

（5） Lowman, J. （1995）. *Mastering the Techniques of Teaching.* （2nd ed.）. San Francisco: Jossey-Bass.

（6） Berk, Ronald A. （1998）. *Professors are from Mars®, Students are from Snickers®: How To Write and Deliver Humor in the Classroom and in Professional Presentations.* Madison, WI: Magna Publications.

（7） Strean, W. B. （2008） *Evolving toward Laughter in Learning.* Collected Essays on Learning and Teaching, v1 pp. 75–79. ISSN-2368-4526.

## A Preparedness for Learning

For students, in preparation and planning for learning, there are physiological issues of body and mind mediated by laughter. These lead to learning ability issues and compounding psychological and physiological pressures affecting performance.

Laughter affects body health. An essay topic on laughter set my students to find in the abundant research that laughter has several healthy effects on our body such as strengthening the immune system, improving memory and a physiological function on our frame of mind. Laughing activates immune strength through the function of NK and B cells.

Meanwhile, memory is based on neuron activity in the hippocampus of the brain and this is improved by laughing. In addition, the function of laughing creates the hormone endorphin dopamine involved in happiness, intentionality and motivation. Laughter improves body function prerequisite for learning.

Learning potential and learning habits are affected by the benefits of laughter. We can elevate our ability to sustain effort, retain information, and activate participation, setting up excellent study potential. These physiological effects of laughter increase cognitive ease and reciprocate a facilitating psychological mood in the student. They can be mutually affective: A good memory and motivation reduce learner stress and so stress on the immune system; A healthy body and frame of mind free the cognitive mind and make memory able and active; Body health and ease of information retention affect motivation to participate. These effects of laughter leave the student able and prepared to learn. Moreover, in the learning cycle they bode well: an ability to be motivated to begin to try, and thereafter to be successful — to retain information, to build on previous lessons, and to keep going.

Poor body health, memory and morale, conversely, can derail the study plans of the most earnest student and lead to psychological pressures, which in turn lead to further physiological pressures. It is tiring to force yourself to do something. The social psychologist Roy Baumeister (1998) says this is an emotional strain additional to cognitive busyness, both of which tax mental energy, resulting in "ego depletion."[8] Daniel Kahneman (2011) summarizes the results as "a lowering of morale and a loss of motivation and a physical depletion of energy resources for mental work."[9] These negative physical and mental states may lead to further psychological stresses where the student forms bad studying habits. Students stress in the event of not being able to study, focus or drive themselves — an increased cognitive and emotional load — compounded thereafter by not having kept pace and having to catch up. Research shows ego depletion has knock-on adverse effects on control of attention — the standard measure of IQ, not measuring for rationality or cognitive error making — as it involves specific genes that are also related to control of emotions. However, environments of learning that promote emotional wellbeing are cited to mediate positively.[10]

The stressed body is not in a state of preparedness to study and the stressed student is a preoccupied student with poor study habits, struggling to manage the holds on her attention and to focus on the immediate demands of the lesson. Laughter mediates for positive

physiological and psychological conditions integral to preparation for self-efficacy in study. Thereafter, in the classroom, psychological pressures are concentrated.

(8) Muraven, M., Tice D. M., Baumeister, R.F. (1998). *Self Control as a Limited Resource: Regulatory Depletion Patterns.* Journal of Personality and Social Psychology, v74 pp. 774–89.
(9) Kahneman, D. (2011). The Lazy Controller. In *Thinking Fast, Thinking Slow.* pp. 41–48. NY: Penguin Random House.
(10) Rosario Rueda, M., Rothbart, M. K., McCandliss, B. D., Saccomanno, L., Posner M. I. (2005, October 11). *Training, Maturation, and Genetic Influences on the Development of Executive Attention.* PNAS v102 n41 pp. 14931–36 https://doi.org/10.1073/pnas.0506897102.

## B The Engagement of the Student in the Learning Process

In the classroom, laughter has a documented role in the mechanism of innovative learning methods. By thinking not only of what is implemented, but how it is implemented, we arrive at the research on the intrinsic role of laughter in success in learning. So, we can talk of method and its delivery.

The mechanism of innovative learning methods can be summarized as an active participation experience followed by reflection. Laughter, evoking emotion, is an intrinsic psychological motivation, which promotes engagement in learning. Swiss clinical psychologist Jean Piaget (1952) observed that the learning processes of children rely upon new experiences and interactions, as opposed to rote memorization.[11] Rather than passive receivers of information, children are active participants, learning through discovery.[12] Michael Prince (2004) defines active learning as an instructional method of engagement of the student in the learning process and finds that it surpasses lectures in fostering comprehension and memory.[13] Experiential learning is defined similarly as students reflecting on what they are doing. These method commonalities are drawn from foundational work by Bonwell and Eison (1991)[14] and Kolb (1984).[15] Kosslyn and Smith (2007), Freeman (2014), and others, show that active learning is effective because it mirrors how the body functions during learning.[16][17] Laughter leaves a body functional and motivated and it is to be promoted in engaging the student's intrinsic motivation, activating deep-learning processes.

Efficacy in learning requires instructors to consider not only what they want the student to learn, but what they want the student to experience. What is interesting in the keywords of active learning methods is that they are not attempting to merely remove learner stress.

Rather, they carefully set up practice conditions for the student to succeed in overcoming natural learning challenges. If successful, therein lies accomplishment and satisfaction. These learning challenges build skills needed, but are not easy, involving emotional strain and, moreover, requiring attention, participation and thoughtful analysis on the part of the student. There will always be students who feel they cannot continue and resign themselves to giving up. These students can be supported by a considered implementation of the active learning method in order to fulfill its promise: a challenge that is, or becomes do-able and a state of mind conducive to such. This enabling environment of learning is produced by laughter. The behavioral psychologist Daniel Kahneman (2011) explains that "a good mood is a signal that things are generally going well, that the environment is safe" and "when we are comfortable and happy, our intuition becomes more accurate and we are less prone to logical errors."[18] "Cognition is embodied; you think with your body, not only with your brain."[19] "Low energy cognition refers to 'flow' in the thinking brain — a state of effortless concentration and this enjoyed, effortful cognitive work equates to low energy use."[20] Here, learning is effective and students experience of effort or strain is reduced.

Laughter, evoking emotion, is an intrinsic psychological motivation, promoting engagement in learning, and this is a good first step in a learning process. Laughter produces a mood conducive to effective learning, and catalyses methods based on engagement in learning towards accomplishment and satisfaction.

(11) Piaget, J. (1952) *The Origins of Intelligence in Children* (Cook, M., Trans.). NY: International Universities Press, Inc.

(12) Peck, M. (2016, July 7). *What exactly is Student-centered Learning?* In The Literacy and Language Center [website]. Retrieved 2018, October 19 from http://literacyandlanguagecenter.com/what-to-expect-from-a-student-centered-program.

(13) Prince, M. (2004). *Does Active Learning Work? A Review of the Research.* Journal of Engineering Education, v93 n3 pp. 223–231.

(14) Bonwell, C., Eison, J. (1991). *Active Learning: Creating Excitement in the Classroom.* AEHE-ERIC Higher Education Report, n1. Washington, D.C.: Jossey-Bass. ISBN 978-1-878380-08-1.

(15) Kolb, D. (1984). *Experiential Learning: Experience as the Source of Learning and Development.* Englewood Cliffs, NJ: Prentice Hall.

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(17) Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., Wenderoth, M. P. (2014). *Active Learning Increases Student Performance in Science, Engineering, and Mathematics.* Proceedings of the National Academy of Sciences, v111 n23 pp. 8410–8415. Retrieved from https://doi.org/10.1073/pnas.1319030111.

(18) Kahneman, D. (2011). Cognitive Ease. In *Thinking Fast, Thinking Slow.* p. 69. NY: Penguin Random House.

(19) *Ibid*. The Associative Machine. pp. 50–51.
(20) *Ibid*. The Lazy Controller. pp. 40–41.

## C The Teacher-Student Connection

Engagement is paramount in the state of mind students need for learning and this is affected by social and environmental conditions surrounding the student. Deci and Ryan （1985） say that to facilitate intrinsic motivation, three significant psychological needs must be present in the individual: competence, autonomy, and relatedness."[21] Micari and Pazos （2012） show that students relate their success in learning to their connection with their instructor. [22] Students 'in the zone' of self-motivation look for an "engaging, empowering, and playful learning of meaningful content in a loving and supportive community", a definition of joyful learning.[23] On competence, autonomy, and relatedness, students will be affected by the learning environment created by the teacher and will be reliant on the teacher in maintaining it. In terms of teacher-student interaction this involves both instructional method and embodying the lesson of how to learn.

Active learning methods set the stage for student competence, autonomy and relatedness. With this aim, teachers set about creating a facilitating mood in the class. On students' self-perception of competence, Kahneman （2011） says the "ability to allocate attention effectively — high self-control and an able and active short term memory — increases intellectual aptitude and learner potential." He says, "If the short term memory cache is abundant, task switching is fast, efficient, easier and less stressful." However, "when anxious or having too much concern about how well one is doing in a task" the short-term memory is loaded. The teacher should set up an environment that mitigates this since "effort in learning and in social interaction both draw from the same well of cognitive ability" and, for the self-conscious student, "monitoring what happens in the environment or in your head" demands effort and causes strain that leaves them "cognitively busy" and unable to concentrate.[24] On autonomy of the student, for which competence is prerequisite, Merolla （2006）, Wanzer, et al. （2010）, Segrist and Hupp （2015）, and others, find that mirth in teachers acts positively on student information processing, retention and stress.[25][26][27] Hackathorn et al. （2011） report a connection between teacher humor and positive student feedback, engagement and comprehension.[28] On relatedness of the lesson, the link to engagement is clear and this applies not only to content but also to mood. Kahneman （2011） comments, "familiarity plays a role in cognitive ease, so we should be consistent in mood in the learning environment we

create." He notes, symmetrical, self-reinforcing, reciprocal links are common in associative thinking, so that, "in our psychology, we like the thing we encounter frequently and associate positive meanings to it" and, "being amused tends to make you smile and smiling tends to make you feel amused." However, "cognitive strain indicates to the brain that there is a problem" — difficult learning challenges make us frown and frowning makes the challenge harder.[29] Indicating to your brain that there is no problem can also be done. Conducting the atmosphere in class, the teacher creates the conducive state of mind the student needs for efficacy in learning, and thereafter, can be timely in maintaining it.

In the maintenance and enhancement of motivation, in my experience, students, if and when they can, transmit a joyful mood to each other, and moreover, they look for it in the teacher and are disappointed and stressed when they don't find it. Mood transfers as an heuristic of the demonstration in which students recognize themselves in the teachers competence, autonomy and relatedness. Alex Todorov et al. (2009) find that facial expressions are read and opinions formed on competence in less than 1/10th of a second.[30] The autonomy of the teacher, meanwhile, acts to support student autonomy specifically in teacher-student interactions and Vlieghe (2014) suggests here the value of laughter as it "may be said to have an intrinsic educational meaning because it allows a significant transformation of individual and collective existence [of] inherent equalizing and communizing potential".[31] This can be scaffolded with instructional methods where teachers are facilitators rather than one way providers of information. On relatedness, as Kahneman (2011) says, there is reciprocity between cognitive ease and a good mood. Demonstrating a light mood in the face of a teaching task transfers to students who smile as a result, and, rather counter-intuitively, try less hard, and experience the task as easier. He adds that laughter will be effective even if faked. The physical action of smiling, brings about a real change in mood. Artificially altering your facial expression, without emotion, produces, never the less, the emotion, and the effect of the emotion, not least for yourself.[32] There is an anecdote from one of my students, describing her basketball coach's advice to her as captain of the team, to laugh even if pained by an error. She didn't understand the advice but decided to follow it anyway. She found that her team mates were positively affected by their captain's laughter. The atmosphere of the group was changed and the team's performance was positively affected. A smile will produce a real emotion of happiness and increase our usefulness to others. Teaching is in the service of student intrinsic motivation and so, it is to embody the best approach to the lesson — one of ease and joy.

Some studies have found student self-perceived competence can change independently of intrinsic motivation.[33] One example might be where the student feels competent but unmotivated by the lesson. Where the teacher is not responsive to student needs, students use humor as a cry for help. For example, during a particularly difficult user-experience computer programming class, I heard a fellow student's wry comment about needing an 'interactive' teacher. Where the teacher is responsive, though, Lewis (2010) finds that the teacher's use of humor is generally a positive influence on students. However, he notes a power difference between teacher and student where it "may not impact, or may even reverse, its positive effect [as not] all forms of laughter [are] equally emancipatory" and so we should have a mindful "pedagogy of laughter" to underly facilitatory, enabling educational relations.[34] A feeling of being effective in this regard is motivating, so we can see how feeling good about something leads to becoming better at it. This is a clue to understanding a facilitating confidence in teaching. Kahneman (2011) describes data that shows that the most productive effect on students is not the teacher's competency, knowledge or lesson planning, rather, it is believing she is doing a good job. So, it seems that that belief is required and since we can have it even if it's not true, it is encouraging to find that believing it makes it true.[35]

Students require a mood of competence, autonomy and relatedness in themselves and in their teacher and these are catalysed by laughter. In the classroom, the teacher is a partner in creating and maintaining that mood and laughter makes the teacher a more accessible partner. Use of laughter in teacher-student interactions embodies the lesson of how to learn. It mediates for teacher self-efficacy. It makes the teacher available and on point to aid students in learning. In addition, it transfers to students as they work with each other.

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## D The Student-Student Connection

Use of laughter pedagogically by students in the classroom in student-student interactions allows for student self-efficacy in focusing on learning challenges. In addition to the acquisition of functional skills, students gain ancillary social and intercultural communication skills as well as professional and problem-solving skills.

Laughter in task-based interactions between L2 Japanese language students shows "complex interplays of their interpretations of activity designs, their appropriation of instructional materials, their negotiation of moment-by-moment orientations, and their positioning in interpersonal relationships" in which "the resourceful use of laughter can be deemed relevant to language learning as it relates to active engagement with language use."[36] Laughter can indicate intrinsic interest, deep learning, and increased information recall.[37][38] Students in academic problem solving stay on-point with their laughter, working on the unfamiliar in the problem to hand epistemologically.[39] In addition, research suggests that the more unfamiliar the challenge, the greater the quantity and depth of laughter, "the better at helping students develop their social, intercultural and problem-solving abilities".[40]

Mei-Ya Liang (2015) describes a facilitating laughter in second language classrooms. She

says that "L2 university students' emerging processes of laughter-talk may lead to their playful acquisition of specific interactional features necessary for professional communication", remedy "insufficient linguistic knowledge" and "bridge the gap between professional communication and classroom discourse."[41] An anecdotal example is given by Kahneman (2011) recounting that in team work "bias effect" where a member feels she is doing more than other individuals, laughter is used with competence, diffusing tensions in pointing out, for example, that there is more than 100% credit to go around.[42] Other discourse research on types, or properly, stages of laughter shows "students sequentially organize laughter and smiling, and use them to preempt, solve or assess a problematic action" and concludes a relevance "for students not only at an educational level but also for their future integration into the workforce."[43]

It may be said, in contrast, that there is a counter-productive type of laughter — Plato deemed laughter a vice — but this needs to be parsed. John Banas et al. (2012) extensively survey the literature and find that laughter among students has a democratizing effect and increases learning, while, in asserting the "inherent equalizing and communizing potential" of laughter, Vlieghe (2014) includes even "laughter in which we are entirely delivered to uncontrollable, spasmodic reactions."[44][45] Laughter, Roth et al. (2011) note, "whereas it challenges the seriousness of [the subject] it also includes the dialectical inversion of the challenge: it simultaneously reinforces the idea of [the lesson] as serious business. Laughter is more than a gratuitous phenomenon. It is the result of a collective interactive achievement of the classroom participants that offsets the seriousness of [the] discipline."[46] Vasudevan (2015) summarizes that "whereas the space to play has been vitally important to the ways that young people communicate and build relationships [it] is also frequently misinterpreted … and often remediated or punished [however] there may be glimpses of being and becoming in the space of a giggle."[47]

We can broaden our understanding of the roles of laughter and its use by students in building both academic and social skills. Teachers can be aware of the functionality of different modes of laughter cognizant of its role for students in creating and maintaining a conducive environment of learning.

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（39）Berge, M.（2017, April）. *The Role of Humor in Learning Physics: A Study of Undergraduate Students*. Research in Science Education, v47 n2 pp. 427–450.

（40）Sunaoka, K.（2018）. *The Interactive Modes of Non-Native Speakers in International Chinese Language Distance Class Discussions: An Analysis of Smiling as a Facial Cue*. Innovation in Language Learning and Teaching, v12 n1 pp. 24–34.

（41）Liang, M.（2015）. *Play Chronotopes: Laughter-Talk in Peer Group Conversation*. Classroom Discourse, v6 n2 pp. 158–172.

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## E Measuring and Improving the Process

It is not a simple matter to measure results and find improvements — isolation of specific causes and effects is difficult. In addition, testing in academic settings provokes anxiety stress, and so, reduces accuracy of assessment. A positive — small class sizes — is also an inhibiting factor in measurement. With a dearth of useful statistics, still, improvements are a possibility if the goal is the active class where the challenges, successfully overcome, equate to student engagement.

Measuring students' use of laughter and the quality of their education as seen by examination, the following study shows the kind of experiment that is required: "Two types of test-taking strategies workshops, one using humorous examples, the other non-humorous examples, were conducted over a four-month period. Thirty-eight participants were randomly assigned to either the humor workshop or the non-humorous workshop for delivery of test taking strategies. The study explored differences between the groups in terms of demographics, self-assessed sense of humor, and pre- and post-workshop physical and psychological symptoms of test anxiety. Additionally, the study evaluated how well

participants' self-assessed sense of humor correlated with post-test scores."[48] However, results were inconclusive, perhaps in part due to small sample size where there is an increased likelihood of finding non-representative results.[49] In the classroom, laughter takes the measure of the efficacy of the lesson. Laughter can be used to gauge the social situation, establish whether the students are inhibited or free to try to communicate, and thereafter assess the state of the learning process. All things being equal — if we have established a robust environment including social and pedagogical issues — one might feel that, for L2 English language students for example, L2 use accurately reflects L2 ability. Language production interference minimized, silence might be understood as L2 inability if the student feels free to laugh. So, using student laughter to assess learning pressures, we can judge that the student is functioning ok in communication apart from the target language of the lesson. Thought experiments have merit in understanding ability and laughter: How do you know that laughter improves learning? You know because those learning with ease laugh more than others. Laughing makes learning easier, which puts one in a good mood.[50]

Improvements can be targeted. Although surveys show that teachers consider "humor to be an integral part of their teaching plan and that humor relaxes students, contributes to a more enjoyable classroom climate, and helps students make content connections, ... the feedback suggested instructors could benefit from targeted training in how to effectively and consistently use humor as a teaching strategy."[51] In addition, involving students in reflection is obvious if the goal is an active class. For example, students could be tasked to think of a large number of improvements to the class. This is to set a challenge which the student struggles to complete, thereby creating the feeling the class was quite good. Since the struggle itself makes the task more difficult — just as smiling makes it easier — the more ways a student lists to improve a class, the more highly they rate it.[52] In addition to a conducive mood being set, the role of mood in learning is demonstrated and can be reflected upon. Assigning students writing tasks, for example to write about the role of laughter in learning, as the anecdotes included in this article attest, is a good way to engage students in reflection on how they apply themselves to learning. Alternatively, measurements and improvements could be approached in terms of a theory only approach. Haynes (2016) lists four theories "used to support the design of [a] course on gelotology, the Humor Processing Theory, Kurt Lewin's theory of unfreezing, changing, and refreezing, the relief theory and the tension release theory."[53] Further, tools from the business world are relevant where the student is a customer and business must be measured and improved. An example would be using "importance-performance analysis, IPA, used by managers to identify attributes to

improve to increase overall customer satisfaction." It "can assist instructors in designing activities by focusing on what they want students to learn. IPA can be demonstrated to guide the instructional design of experiential learning activities."[54]

The use of laughter in learning may feel to teachers less difficult to understand than to quantify, yet both are complex. There is a lot of psychology and counter-intuition. Yet, if laughter is the catalyst of a mood of competence, autonomy and relatedness, it is also its demonstration. Assessing the roles of laughter and integrating its use in the classroom would benefit student and teacher self-efficacy.

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## Conclusion

Laughter has a role throughout the cycle of learning. The student's mental and physical potential to learn is affected. Her preparation and learning habits are affected. In the classroom, laughter aids her navigation through the myriad student interactions and between herself and her teacher. The teacher can be cognizant of this and considerably affect learning processes. The potential of laughter can be released through active teaching methods — a certain class structure or organization and class planning for student exchanges, setting up a fruitful cycle of engagement, accomplishment and satisfaction in learning for the student — and through ease of comportment or embodying the lesson of how to learn. In conclusion, although it seems inconsequential, and unplanned, laughter's effects are wide ranging. Given this, it is funny that it is not more integrated. Humor can't be planned for, of course. However, in preparation for teaching that goes beyond what is scripted or scheduled, laughter has a role in teacher self-efficacy and this is extensively

supported in research available on pedagogy. Laughter makes us better in our abilities. The advice is that lesson planning does not lead to a rigid, pressured frame of mind, rather, it leaves the teacher responsive to the student and the conducive state of mind students need for efficacy in learning. The highly prepared teacher is cognizant of the job as a performance which seeks out audience participation and this is where the whole production truly has meaning.

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