

**LEARNING HOW TO LEARN: AN ESSAY ON THE PHILOSOPHY OF EDUCATION**

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# LEARNING HOW TO LEARN: AN ESSAY ON THE PHILOSOPHY OF EDUCATION

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The question of how to educate our youth has been a tradition in philosophy since the time of the ancients and now has become highly debated issue in contemporary society. While answers to this problem take on many different forms, there is a way to interpret much of the canon as arguing for an education that strives to pass down the ability to learn on one's own. 'How educators are supposed to support such an aim,' is the primary question of this work. To thoroughly answer this question, many aspects of education must be considered: classroom behavior, curriculum, theories of learning, teaching, and evaluation. These problems are addressed in the spirit of a constructivist view on education and are supported foundationally by philosophical arguments – primarily Wilfrid Sellars's views regarding the process of becoming a language user. Accepting Sellars's model of language acquisition and a modern view on the nature of knowledge, an immersive approach to 'learning how to learn' is taken. Designing a curriculum that emulates a structure of knowledge, slow and thorough inculcation of creative and critical thinking skills, and taking seriously the notion of teaching as a *practice* are all central themes to the proposed system. Elaborating on how to bring these pieces together into one view on education is the fundamental thread of the work, though, secondarily, there is discussion of harmful practices that are current in education. To actualize a system that truly aims at learning, it will be argued that grades and standardized tests are methods of evaluating that must be disabused. The argument for this is that their affectation on the attitudes of students and teachers has an undermining effect on the educational ideology that is central to this thesis. Bringing all

of these parts together, the hope is to not only build an educational ideal with a system that inculcates students with the ability to properly learn, but also provide for an institution that supports human flourishing.

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## 1.0 INTRODUCTION

The motivation behind everything that follows started by noticing an almost dualistic separation between students who I had met: those who learned information by integrating it into a larger scheme of interrelated concepts and others who learned information in isolated bits that may or may not ever be pieced together. This started as an observation from teaching, debating with, and listening to other students. Then, as my knowledge of modern philosophy began to burgeon a deeper understanding of the nature of thought, language, and the mind, this mere observation became something explainable. Thought, in its rational, human sense, is something conceptual, and our understanding of it can be guided by our understanding of the conceptual world. Knowing, on the other hand, is the ability to use reasons from within this conceptual space to justify claims made by an individual. Aware of it or not, this seems to reflect the nature of our human intellectual state.

The phenomenon I had observed began to seem like an asymmetry in the way people were handling their education. There were those who tried to memorize everything as if it were a fact and take away a rote understanding of classroom material; then standing in opposition, were students who constructed facts, thoughts, and opinions out of the holistic body of information being given to them. This latter type of student would realize that a concept taught in mathematics was not necessarily inapplicable to an analogy when discussing literature, and would understand and respond to new (good) reasons by adjusting their old way of thinking



accordingly. I began to view this asymmetry as those who had ‘learned how to learn’ properly and those who have not—the idea of proper learning being one that descended from the nature of our knowledge that I described above. It was the difference between someone who believed learning to be the filling of a bank of facts versus someone who believed learning to be the process of changing their views. In both cases, people’s beliefs and opinions would eventually shift, but the latter with fluidity and an understanding as to why they must.

I started to think that if we could get this ability of ‘proper’ learning into all of our students - universities would flourish. Not only that, but the ability for entities like the media, politicians, journalists, etc to play with our intuitions by showing surface level ‘facts’ and expecting us to respond with fear, disgust, anger, or whatever hoped-for response, could be reduced drastically. The first question I sought an answer to was, “what is it about our education that is making people so passive about the information they take in?” With this question in mind, I began an investigation into our current educational ideologies while also continuing to consider the same individuals who elucidated this problem to me in the first place—philosophers. What came out of this hunt was an approach to education that is imbued with lessons I have learned from philosophers and many ideas from contemporary educational theorists who were screaming for the same changes I will be advocating.

With this story in the open I will now delineate my plan for expounding this approach. Starting from a broad perch, I will begin by discussing goals of education. I take a historical look at how philosophers have argued for what a primary goal in education should be: from the ability to participate in a democratic society to the desire for students to think like scientists. Primarily, I will be arguing that identifying and integrating proper learning techniques into our educational system both coalesces with and bolsters the goals that have been argued by

philosophers of the past. To clarify how I plan to structure an educational theory that places the ability to learn as the central goal, I will spend the remainder of the chapter introducing the idea of a ‘learning how to learn’ system. The contrast I hope to be pointing at, between the style of education being argued for in this paper and more common educational methods, is that the standard for student progress is the bettering of her ability to learn new information rather than looking to her accumulation of facts and formulas.<sup>1</sup> I will begin by discussing how the classroom should function in such a system and, subsequently, will look back to give credit to the theories of Jean-Jacques Rousseau and John Dewey as both have been influential on the progression toward this idea. Finally, I will discuss the places of creative and critical thinking within this approach to education.

Once I have provided an introductory exposition of what I will be arguing for, the second chapter moves on to how I believe a curriculum should be structured. This will enter into the most philosophic part of this work. Prior to delineating my views on curricula, I will set up a foundation for these views by discussing the nature of concepts, conceptual thinking, and the process of learning, respectively. A dialogue on these concepts is necessary so that there is no confusion as to how I will be talking about them when deploying them in the context of a curriculum. Then, borrowing from the writings of Ludwig Wittgenstein and Wilfrid Sellars, I will generate a functional theory of learning that I will be using. Coming away from these ideas, I will finally be left in the clear to explain what a curriculum looks like in this system, highlighting the importance of concepts being connected and constructed in a structured manner.

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<sup>1</sup> I should not be heard as saying that the latter is unnecessary; instead, I am merely attempting to refocus the sights of educators on the former.

Having put into place the conceptual structure of this system, I will move to the practical matters of how material should be taught and evaluated. This will begin with an investigation into the practice of teaching. To start, I will explain the qualities a teacher should have to both be effective in this practice and useful in the ‘learning how to learn’ system. I will put the spotlight on three main attributes: mastery of the knowledge one is teaching, communicative clarity, and empathetic understanding. The next logical step for me to take is to explain how I believe we should train teachers such that they can hone these abilities and integrate well into an educational system that seeks to provide proper learning skills to students. My suggestion will be to take seriously the idea of teaching as a *practice*<sup>2</sup>, and thusly to see teacher training as something separate from education on the theoretical literature. The type training that I will support will involve teachers being trained in a similar spirit to the previously mentioned theory of learning: training that takes place within the school and is monitored by experienced teachers. Moving past teaching, I will then examine the methodology and ideology behind assessment. What exactly are we assessing in a ‘learning how to learn’ system, and how should it be done? This will lead me to criticize many of our current methods of assessment because they seem to be unfit for an evaluation of the progression of a student’s learning abilities. I will conclude this chapter by taking the example of standardized testing as a measure of learning ability—highlighting the ways it is harmful to education: it can corrupt teaching and is a misleading measure of a student’s learning capacities.

My final chapter will be terse, but follows from all that I will have put into place. I will discuss my views on the extended implications of a system that aims at inculcating proper

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<sup>2</sup> This would be in opposition to the idea that the ability to teach is *knowledge*, which one can master through academic study.

learning abilities as a priority over accruing specific knowledge. The two 'extensions' I will be focusing on are post-secondary education and the ability to participate in a democracy. I will elaborate on what I see as hindrances to these two parts of society and why I believe the educational system I am advocating could alleviate these issues.

## 2.0 LEARNING HOW TO LEARN

### 2.1 RESOLVING AIMS IN EDUCATION

Education is an age-old concern of philosophers, and rightfully so, seeing as philosophy is a discipline that attempts to get to the heart of issues surrounding our existence and a child's formal education sets the foundation on which much of her experience will rest. Philosophers of every time period leading back to Plato had their own answers to the question of how we should educate our youth, and in no way have we reached point where this problem should be quieted. Due to the fact that each generation will have its own demands and values, it appears unlikely that this issue will ever be entirely resolved. Despite all the attention, there remains a piece of the puzzle that has been ignored in the way we structure our educational systems—regardless of what our final goal is, we must first ensure a child's ability to get the most out of her education.

It comes as no surprise that this has not been central to educational discussions; due to the natural progression of a child's learning through language acquisition, the human mind clearly has *some* innate ability for pattern recognition and 'learning'. Though a few students may concomitantly develop a higher ability for learning from this initial disposition, it is worrying to assume that the majority of our educated population will naturally reach a level that allows for the full appreciation of what a formalized education has to offer. Looking to philosophers'

thoughts on this matter, I believe it will be clear why the primary aim of proper learning fits naturally into the body of philosophical thought.

Before moving into *how* one should aim at the goal of proper learning, I would like to first show why this goal supports, and, in some cases, is tantamount to the goals philosophers have displayed in the past. Surveying the aims in education from a historical vantage will aid in proving my thesis to be a workable approach in the context of the philosophical canon.

In a chronological progression, I will supply the generalized opinions of many of our more commonly referenced philosophers in hopes of showing how their thoughts fit in with the goal of ‘learning how to learn’. I will begin, in common pedagogical fashion, with two of the fathers of philosophy—Plato and Aristotle.

“Both Plato and Aristotle take the education of citizen-rulers as a primary aim of the *polis*: it pervades every aspect of civic activity and it never ends.”<sup>3</sup> As explained in Plato’s *Republic*, individuals should be placed into separate types of education (which also assigns them to a societal class) in virtue of their natural abilities. The most important is that of the ‘philosopher ruler’ who “should be able to think critically and dialectically, ordering their beliefs into a unified system.”<sup>4</sup> Believing in a sort of trickle-down effect, Plato hoped that if we were able to keep our rulers from taking on a bias in their beliefs and train them in knowing what is good for the whole, they would be able to watch over the state - instilling order and justice. These ideas are also part of a larger view on education that can be elucidated through the story of the Cave in which a prisoner is slowly brought to abandon his old beliefs about ‘shadows’ to

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<sup>3</sup> Rorty, Oksenberg Amélie. *Philosophers on Education: New Historical Perspectives*. “The Ruling History of Education.” Rorty, Oksenberg Amélie (Ed.). Routledge: 1998. New York, NY. Pg. 3.

<sup>4</sup> Ibid. pg. 3

become enlightened to the truth by seeing the sun. Though today's society is structurally different than the one of Plato's time, it can be seen that his desire for a ruler who thinks in a 'unified system' aims at the same mark that I am suggesting with 'proper learning'. I will obviously depart from the caste-like model of education he proposes; however the final abilities of the philosopher-ruler reflect the educational ideals for which I will argue. Without skewing the intent of Plato's Cave Analogy, I would like to also point out the similarity of such an idea with the asymmetry between learners I was suggesting in my introduction. These two extracted educative aims – the thinking capacities of the philosopher-ruler and the Cave – can both be seen as paralleling the goal of instilling 'proper learning' in the minds of students. Aristotle, on the other hand, believes in a balance between "...the respective contributions of reason and habit to a life of practical virtue."<sup>5</sup> In his view it is important to have this harmony between practical wisdom and intellect, as it is the only way an individual can find true happiness. Happiness is derived from an individual being able to fully integrate themselves as citizens into a city-state. Thus, education must aid individuals in the process of realizing their natural place in the society they are born. Finding one's place in society is a difficult undertaking "hence Aristotelian education has three broad constituents: training for the body; habituation for the appetites and emotions; and instruction – or "education through reason" – for the rational part. Their collective goal is to produce an harmonious, integrated person, one whose soul is organized so as to best promote his true happiness."<sup>6</sup> I point out this part of Aristotle to bring out one of the major themes of this thesis—that proper learning will be the best means to an individual's ability to fit into society. The hope is that upon a student's completion of a formal education, the ability

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<sup>5</sup> Ibid. pg. 3

<sup>6</sup> Reeve, C.D.C. *Philosophers on Education: New Historical Perspectives*. "Aristotelian Education." Rorty, Oksenberg Amélie (Ed.). Routledge: 1998. New York, NY. Pg. 54

to find and flourish in the areas of society she is most drawn toward will be transcended to her regardless of whether those exact skills were explicitly taught in school.

Moving ahead in time to Rene Descartes, whose views regarding education – without having ever been made perfectly explicit – seem to hold the mind of a scientist as the paragon of educated minds. Believing that “...the analytic method provides the basis and model for inquiry; the mathematical scientist is the new authority.”<sup>7</sup> Hoping that moral education would take care of misinformed passions, Descartes thought teaching students about scientific analysis would provide them with a trained mind for problem solving. I should mention that much of Descartes educational philosophy relies on the notion of innate ideas, which I reject; however, I bring him up for those inclined to agree that the mind of a scientist is the properly trained mind. The methods of proper learning I will be describing are continuous with the end goal of a scientific mind. Particularly in discussing critical thinking, it will be seen that there are clear parallels between the analytic method Descartes believes in and techniques of proper learning of which I am a proponent.

Now, coming to a more prominent figure in the history of education, John Locke, who brought about ‘sensationalism’ in education: “Learning by doing is the great pedagogical innovation [of Locke]: the languages were to be acquired by conversation and travel rather than by the study of the classics; scientific education was, as much as possible, to be grounded in observation and direct experience rather than expounded as a deductive system.”<sup>8</sup> Clearly the idea here is that students should be learning by experience more than instruction. This thought will be echoed later when discussing the works of Jean-Jacques Rousseau and John Dewey. Due

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<sup>7</sup> Rorty, Oksenberg Amélie. “Ruling History of Education.” Pg. 6.

<sup>8</sup> Ibid. Pg. 7



to the amount of space I will commit to this stream of thought later in this chapter, I will only say for now that the idea of learning through experience will play a big part in the pedagogical side of my discussion. The purpose of bringing up Locke is to give credit to the figure that opened the doors for Rousseau and Dewey, and to highlight his ideas as being influential on my own.

David Hume “...reintroduces the imagination as a central protagonist in moral education.”<sup>9</sup> He views the ability to feel empathy toward others as the key to being able to give a true moral assessment to an action or individual character trait. Mostly interested in moral education, Hume wants students to have a cultivated imagination in order to make the emotions and thoughts of others something we can recreate as our own. The use of imagination plays an important role in creativity and, as Hume said, the ability to understand what another is thinking or feeling. While my focus is not moral education, in particular, Hume’s want for a developed imagination is an important aspect of what I will be discussing under the heading ‘creative thinking’. Later in this chapter I will explain the role of creative thinking to proper learning, and I believe this will ring in harmony with this aspect of Hume’s philosophy of education.

Immanuel Kant believed education should support individuals in developing autonomy as rational and moral agents. As far as moral education goes Kant sees “The task of moral education is that of bringing children to understand what reason, properly understood, demands.”<sup>10</sup> Without getting into a detailed examination of the connection between moral education and autonomy, this does seem like a perfect example of an educational goal that relies on students having the capability to learn. Kantian autonomy seems to be suggesting something similar, if not the same thing, to what I am suggesting in saying that education should be aimed

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<sup>9</sup> Ibid. pg. 7

<sup>10</sup> Ibid. pg. 8

at developing proper learning skills. In the same vein as Kantian autonomy, being able to integrate reasons into a larger mental framework is a key trait of a good learner. Rational self-reliance is what I see as separating an active, well-groomed learner and a passive, regurgitative learner. Thus, I see Kant's crosshairs being directed toward the same results as the educational system being argued for in this paper.

Finally, pushing two of the most influential members in the philosophy of education together, we come to the theories of Rousseau and Dewey. Rousseau believes in an education that is natural and thus our aim should be to allow a child to develop by learning from the natural world as much as possible. A child "...must learn from experience, from seeing the natural consequences of his actions."<sup>11</sup> Dewey also has a quite vague notion of educational aims that are described to be completely subject to the future and remote situation of the learner.<sup>12</sup> He also takes education to be intrinsically valuable, and thus, being educated is a goal in itself. Both views have their own places where they fit into the picture I am painting. In Rousseau's case, while I differ on his views regarding a fully natural educative process, I do, however, see the ability to play off of the curiosities of the child as an important part of teaching. Rousseau's ideas regarding the clever tutor who acts as a guide in a child's development and aids cultivation of one's own natural ability to problem solve will serve as influential thoughts during the discussions on teachers. Dewey's view of education being valuable in itself as well as having an aim towards the relative future of the learner seems to follow suit in the argument at hand. Formally being taught how to learn should come first in order to have the ability to appreciate one's education and thus be able to aim oneself toward fulfilling future goals.

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<sup>11</sup> Ibid. pg. 9

<sup>12</sup> Cf. chapter eight of Dewey's *Democracy and Education*.

The views of Dewey and Rousseau are ones that I will come back to further in this chapter as they are important to explaining the idea of learning how to learn. I believe that a look through history was important for contextualizing my argument within the canon of philosophy, particularly in showing that the thought has been latent in the tradition of philosophy of education. Despite having shown that learning how to learn is an idea that makes sense in the history of educational thought, it is crucial to point out that this notion has not been taken seriously in our current system. Borrowing a quote from contemporary philosopher Paul Standish should add to the hovering suggestion that it is dangerous to be pushing for too many outside aims (i.e. aims that are not explicitly about improving learning) within our educational institutions:

...it can deflect the attention from the diversity of education, from the fact that it is not just one thing. When the assumed focus of much philosophy of education was on schooling, this was understandable, if regrettable; with the growing sense of urgency about education beyond school age, with the expansion of higher education, and the new hype for lifelong learning, inattention to this diversity is inexcusable. And this should carry with it a more prominent acknowledgment of the ways in which education takes place outside institutions and beyond formal attempts to educate. In sum, the implications are not that the question of aims should be avoided but that it should be broached with greater reservations and sensitivity to this diversity.<sup>13</sup>

Readjusting education to be centered on a student's ability to learn in a mature and complete manner not only takes into consideration the diversity of what is available to students following their primary education, but also allows the full range of that diversity to be a real possibility.

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<sup>13</sup> Standish, Paul. *A Companion to the Philosophy of Education*. "The Nature and Purpose of Education." Curren, Randal (Ed.). Blackwell Companions to Philosophy. Blackwell Publishing: 2006. Oxford, UK. Pg. 223

Coming toward the end of the section regarding why ‘learning how to learn’ fits as a foundational goal in education, I get the worry that the entire notion could sound a bit nonsensical. An intelligent question one might ask at this point is, “How can you *learn* how to *learn* if one cannot *learn* in the first place?” In case this is something that has bothered any reader up to this point I would like to take a moment to mitigate this worry. As I stated at the beginning of the paper, there is no doubt that the majority of people have at least some ability for pattern recognition as we all learn language by simply being immersed in it. This sort of immersion is analogous to how I envision a school system that is teaching students proper learning skills. Primary education would be such that we provide information, create assignments, and come up with activities that emulate a strong learning process. Though I am about to go into a greater level of detail regarding this process, it is important to understand that no prior learning skills are necessary for the functioning of a program such as the one I am suggesting. The only assumption I will make is that students coming into the system will already have been inaugurated into our shared linguistic community.

Having seen why the notion of an education whose primary goal is proper learning is reasonable, the following section will give an account of how it is we can teach learning skills.

## **2.2 FACTS AND HOW TO USE THEM**

For most students, after two or three years at university, it is common to feel regret for the way one approached their learning only a few years prior in secondary school. The level of thought one achieves by having to learn at a pace being set by the professors of a well-respected

university makes the groundwork covered by a secondary school look like paces in comparison to the miles being traversed in higher education. Without a doubt there are many differences between a high school student and a college student, but it is difficult to come to a conclusion regarding what it is that mentally separates the two. This question cannot be answered with an explanation of some massive change in capacity the mind undergoes during the course of a year or two, but instead appears to be answered by peering into the way one adapts to the learning style of a university classroom.<sup>14</sup> Information is still being given in a similar format to that of a primary or secondary school – lectures and textbooks – except now students are required to be more creative and analytical while also being asked to complete their tasks with some alacrity. It is in this drastic change of class expectation that the dualism I was alluding to in the introduction becomes salient. All of a sudden, students who have not adopted a strong learning process will begin to be left behind in their classes. An investigation of the details involved in a learning process should elucidate how this separation may have occurred.

When learning any subject, from first grade to senior year of college, there is a foundational activity that requires one to merely be retentive—listening or reading, and in turn storing some information—and a second process in which one must use that information to construct a new piece of knowledge by testing how it fits into other beliefs one has and reflecting on the new information in attempts to fully understand what it means. Without having done the secondary processes mentioned above, the new information is nothing more than a fact the student can recognize. An extension of this style of learning characterizes the type of learner I

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<sup>14</sup> There seems to be something further that may be said about the maturity of the learner and the unfavorable way our culture has come to perceive education. I want to highlight these points as topics that should be separately considered in developing a holistic understanding of our education systems; however, here I will be concerned with the capacity to learn as an isolated topic.

spoke about in my introduction. A common philosophic analogy that brings out the aspect I am pointing to would be the difference between a human who smells smoke, feels heat on a door, or can see flames in a variety of contexts and yell, “Fire!” and a parrot who has been trained to squawk, “Fire!” when its owner lights a candle in front of its cage. One has a full conception of what fire is and the possible danger it may cause whereas the other can simply identify fire in a binary manner. Though this paper is not attempting to delve into arguments regarding the nature of concepts language provides us with or the difference between human and animal concepts, this example is one that is familiar in contemporary philosophy and hopefully elucidates the difference between being able to regurgitate information and fully understanding it. It is a point of analytic understanding, where one learner is memorizing facts in isolation and the other is making sense of the fact in a broader scheme and, thus, can be seen as someone who ‘knows’ the material.

Bringing this thought to the educational realm, let us say we are teaching a student Faraday’s Law of Induction. An example of the difference between the merely retentive learner and the one who spends time critically engaging with the information is this: the merely retentive learner could easily answer a true or false problem that states, “A changing magnetic field produces a current in a closed loop,” or a problem that is explicit, asking, “If the magnetic field between a current loop .3 meters in diameter changes from 4 Teslas to 6 Teslas in 4 seconds, what is the average induced emf?” However, only a student who has tested out the idea in several contexts and incorporated it into a greater framework of thinking would be able to answer a question that asks, “What direction will the current through a loop of wire move if a wire with current of +6 C/s is placed parallel to the bottom of the loop?” Answering a question like this requires one to recognize how Faraday’s law fits in with other concepts of physics as

well as be able to creatively use the different concepts in such a way that will elucidate how one could answer such a question (regardless of having been taught how to answer that specific kind of question).<sup>15</sup>

This example brings out educational ideals similar to the ones found in Kantian autonomy (teaching for critical analysis) and the Humean imagination (rather than using imagination to generate empathy, using it to spatially understand how a problem is functioning), and has provided a tangible representation of what the hope is – to create a learner that can answer the latter type of question presented above.

Achieving this takes more than just presentation of specific information that alone will shift a student's thinking abilities; rather, as educators, we must be working to gradually improve a student's learning process in order to accommodate the sort of thoughts necessary for this type of problem solving. Returning to the analogy of immersive language acquisition, if we expect students to adopt the critical and creative thinking skills necessary to fully learn something, then schools must be a place whose program of study is inherently inculcating these approaches to learning. In the same way that language slowly becomes a mode of thought for a child through grasping the appropriate use of its information (the vernacular of the particular language) via an immersive conditioning<sup>16</sup> process—assimilating to creative and critical ways of thinking follows a similar modus operandi and can be seen as being somewhat isomorphic to the language learning process.

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<sup>15</sup> To ensure total clarity, solving a problem like this would require a student to recognize that moving charges create magnetic fields and that placing an additional wire in the vicinity will provide for a changing magnetic flux through the loop of wire.

<sup>16</sup> I stray from merely saying an immersive process because, as will be seen in the next chapter, there seems to be aspects of criticism and reward/punishment inherent even in our immersive acquisition of language.

Now it is important to begin describing how a classroom can be structured so as to immerse students into a proper learning process. When teaching any concept, the first course of action is to provide a set of foundational facts to which any further learning of the concept is subsequent. Immediately following this the teacher must ask questions and provide activities that model the thought process of a well-educated mind. The hope here is that this process will both aid in construction of the relevant knowledge and pattern the proper thinking skills into the learner. This will involve, but is not limited to:

1. Testing the basic ability to identify the new information
2. Properly examining how the new information fits in with other related information
3. Ensuring the student knows the rudimentary instances when the new information is applicable and when it is not
4. Assigning a creative activity that uses the new information in a multidimensional<sup>17</sup> manner<sup>18</sup>

This half of the system, where creative and critical thinking skills are being implanted, will be discussed in more depth in the following section. For now, however, it seems a grounded example showing how these abstract principles may be applied will make my argument clearer.

Allow me to say that we are teaching a class about mammals. The first step would be explaining the most basic facts about mammals: making the students take note that mammals are

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<sup>17</sup> The reason I use the word multidimensional is that the activity should not be limited to using a skill set that is exclusive to the topic being learned and, if possible, it should cross over into other educational areas. This will be made more explicit through example.

<sup>18</sup> This thought can be traced to Dewey's idea of knowledge construction being both a physical and intellectual activity: "...when teachers attempt to transfer knowledge to their students this will be "cold storage knowledge" unless the students are active in using it in application "to their own purposes"" [Phillips, D.C. *A Companion to the Philosophy of Education*. "Theories of Teaching and Learning" Curren, Randal (Ed.). Blackwell Companions to Philosophy. Blackwell Publishing: 2006. Oxford, UK. Pg. 240]



warm-blooded vertebrates<sup>19</sup> which normally have hair or fur, secrete milk, and, for the most part, give birth to live young. This could also be done along with showing a short film or providing pictures and taxidermy of mammals with which the students would be familiar. Following the more passive part of the class, the teacher could then pass out a worksheet with different pictures of animals on it and ask the students to identify which ones are mammals and which ones are not. After having quickly tested their ability to identify mammals, the next handout should begin engaging with material from a related lesson they have recently been taught. For instance, if the students have already learned about amphibians, the activity would involve passing out a detailed image of a frog with its anatomy labeled and asking the student to explain what is different and alike about the frog and some mammal.<sup>20</sup> Now, having placed this lesson into the larger conceptual framework of related lessons, it is important to dig into the new information with critical questioning. This could be a worksheet or slide show including both mammals as well as animals that are not mammals and asking the students to explain *why* it is one would classify each different instance as being a mammal or not. Activities like this are crucial for clearing up the minor nuances between different pieces of knowledge that often breed confusion. Two examples would be aiding the students in understanding that a duck-billed platypus is a mammal even though it lays eggs and that sharks are fish even though many have a gestation similar to that of mammals. Obviously the details of how biologists divide lines in species is a much more advanced topic, but the general idea here is to have students testing the boundaries of the new material being taught. Finally, a creative project should be assigned to both force the students to

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<sup>19</sup> I will assume that *warm-blooded* and *vertebrates* are concepts that are familiar to the students, which seems reasonable, as these distinctions are fundamental to being able to understand the categorization of animals.

<sup>20</sup> This activity could be expanded to include information drawn from multiple recent and/or relevant lessons depending on where the class is in the curriculum.

be dynamos of their own learning by asking them to generate an instance of their understanding and open the opportunity for cross-disciplinary learning. . Perhaps giving out colored pencils and paper and asking the students to draw their own animal – giving it whatever biological features they would like – and allowing them the chance to explain why it would or would not be classified as a mammal. It may also be beneficial to choose groups for the students to work in as many educators find it important to allow students to learn from one another as well as from their own initiatives.<sup>21</sup>

It may look to someone reading this that the passage above describes phenomena common to today’s classroom environment. I would like to point out some of the places I see myself as departing with orthodox methods. Firstly, these activities should not be things assigned for homework, or handouts given out the following day, but instead activities that are all done *immediately* following the initial presentation of the material. The cross-disciplinary aspect should be given a lot more weight in the planning of the lesson, which is something I see as being ignored in current practices. Further, the teacher must be careful in choosing how questions are asked and what examples are given because the point is to ensure a full construction of the knowledge in the pupil’s mind – a point which will later be developed in a discussion of the analytic understand that is needed for a teacher to be the most effective.

The crux of the matter here is that if we can implement this model of learning to students at a young enough age, then over the course of a few years it will begin to feel natural for a student to question herself regarding new information, reexamine old knowledge, and develop a sense of creativity in her normal mode of thought. In order to prepare a student for any interest

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<sup>21</sup> For more on this idea look to Vygotsky’s “zone of proximal development”, which D.C. Phillips explains as, “...the “zone” in which children develop with the assistance of others, rather than relying on their own independent efforts” [Ibid. Pg. 240]

she may want to pursue later in life, it is important to inculcate and refine all of these learning skills. Repetitively providing an intense examination of new information as it is learned will eventually become second nature to students as they ascend into higher levels of education.

Having spent some time on examples to elucidate the type of learners and classroom environments that the ‘learning how to learn’ system hopes to burgeon, the following section will focus on explaining how critical and creative thinking play into the process of developing proper learning skills. Borrowing some ideas from Rousseau and Dewey I hope to make an argument for how and why new information must be examined both critically and creatively, pointing out why this is beneficial for accelerated and slower learners alike.

### **2.3 LESSONS FROM DEWEY AND ROUSSEAU: WHY CREATIVE AND CRITICAL THINKING ARE IMPORTANT**

A point of agreement between most philosophers of education is that facts alone will not lead to an educated individual.<sup>22</sup> As a matter of fact, Rousseau would have liked to go a bit further and say that we should give as few facts as possible allowing for natural questioning to do the work.<sup>23</sup> The problem is, how exactly does one teach something as abstract as ‘creative thinking skills’. Previously, I gave a taste of what a lesson that aims to impart thinking skills as well as

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<sup>22</sup> Look to any of the contemporary movements in education such as constructivist (the current trend which I will be advocating when talking about curriculum) or progressive/child-centered education.

<sup>23</sup> As Amélie Rorty points out in talking about *Émile*, “The Tutor’s Maxims give the clearest account of Émile’s psychology: never tell Émile anything he doesn’t ask about.” [Rorty, Oksenberg Amélie. *Philosophers on Education: New Historical Perspectives*. “Rousseau’s Educational Experiments.” Rorty, Oksenberg Amélie (Ed.). Routledge: 1998. New York, NY. Pg. 248.]

facts might look like; however, this is a complex process that has more than one solution. That is why I would like to speak in detail about what critical and creative thinking do for a learner, and suggest how one may go about teaching these skills.<sup>24</sup> Ideas from Rousseau and Dewey will help in the discussion. Even though I separate myself from their general philosophies of education, the thoughts they have presented on how to educate an individual coalesce with my own in regard to teaching creative and critical thinking skills. Most importantly, this section is meant to discuss the importance of these thinking skills and how to help a student engender them.

The problem with an educational system that relies on mere retention of information is that even in an ideal case where a learner has an immense capacity for memory there is no guarantee that the student will understand the importance (in terms of other knowledge they have) or usefulness of new information. The reason I speak so repetitively about creative and critical thinking skills is that facts can neither be used nor fully understood without them. When I say to think creatively, I mean to develop the capability to apply specific content that has been previously taught to new and appropriate scenarios – hoping to also inspire originality or imaginative energy. This can take a variety of forms: being able to read a novel and recognize the appropriate political and historical messages, solving a physics problem that requires the use of multiple concepts, or even to simply aid one’s learning of basic statistics by envisioning a workable Venn Diagram in one’s mind. In order to be a successful thinker, the ability to move around pieces of information in one’s mind quickly and usefully is imperative.

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<sup>24</sup> I will be giving an analytic account of the creative and critical thinking processes in the second chapter when I delineate a theory of learning. For now, I am trying to get at why they are important and ways in which they can be taught.

Critical thinking, on the other hand, takes on a different role in learning—that of ensuring correct understanding in the uptake of information. Continually questioning one’s understanding is what prevents students from merely taking everything at face value (something of which today’s education systems sees far too much). Without having asked oneself questions like, “Why is this important?”, “Does this contradict with ‘x’?”, or “How can this be the case knowing that ‘y’?”, it will be impossible to make the transition into being an autonomous learner. The act of self-examination gives learners the ability to carefully break apart new pieces of information in order to fit them in with the rest of one’s body of knowledge and be sure to disabuse any erroneous understandings. It is the difference between seeing a photograph of the Taj Mahal and walking through it, or looking at the engine of a car and building one. Thoughts that have not been examined are nothing more than one-dimensional objects sitting helplessly in a three-dimensional world.

The importance of creative and critical thinking skills to learners is one thing, but imparting them to a student is another. Though students will have varied capacities regarding how well they can critically or creatively think about different subjects, basic use of these skills is necessary to say one has ‘learned’ anything. Borrowing from above, teachers will need to be setting a model of how to properly think by prodding students to use critical and creative thinking concomitantly while absorbing new information. Obviously, there is no one exclusive way to do this, but emphasis must be placed on asking the right questions and assigning well-thought-out creative activities in order to get the ball rolling. It is on these points that I would like to draw parallels to Rousseau and Dewey. Rousseau sees the development of critical thinking as something that comes naturally through questioning with keen direction being provided by one’s teachers; whereas Dewey takes on a pragmatic view of student learning where

learning by doing and active problem solving are of the highest importance. These two views will support me in arguing how teachers can pass on thinking skills to their students in the proposed 'learning how to learn' system.

Beginning with Rousseau it is first important to point out that in abstracting ideas from his philosophy I have no intentions to argue for or against his ideas of the political society or formal schooling corrupting individuals. As a matter of fact, I would like start by stating my problem with his natural education as well as the progressive educators who came after him: An educational system that relies on children naturally coming across the lessons they should be learning "...assumes that children *can* inquire meaningfully in a variety of subject domains..."<sup>25</sup>. Even students who may have a proclivity to excel in learning a single subject will in many cases have a difficult time tackling another educational topic. Rather than giving children *complete* control of where the lesson goes, it is much more efficient to be setting an example of the kinds of questions they should be asking in each subject, and put them on track to be successful in any field they may find interesting in the future. Moving past this point of separation, allow me now to continue on into the lesson I *do* think educators should learn from Rousseau.<sup>26</sup>

The role of the tutor as a leading inquirer is similar to the way I interpret teachers as needing to be in order for strong development of critical thinking skills in their students. Not to say that schools are designed in such a way that teachers never ask leading questions, but that

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<sup>25</sup> Phillips, D.C. "Theories for Teaching and Learning." Pg. 236

<sup>26</sup> For more regarding some of the presuppositions Rousseau has in his educational system look to Amélie Rorty's *Rousseau's Educational Experiments*. She sees an even larger underlying presupposition than I see: "...all three educational strategies [of Rousseau's] have the same problems: they presuppose the conditions they are meant to achieve; they depend on the intervention of a benign, paternalistic, unflawed Legislator-Tutor, and they introduce elements and structures that undermine the primary aims and directions of education." [Rorty, Oksenberg Amélie. "Rousseau's Educational Experiments. Pg. 244]

stress must be put on these questions being consistently asked during the introduction of new material. It is in this way that learners can develop the critical capacity to analyze information on their own and, in turn, discover the array of ideas connected to any single, new fact. Critical questioning prevents students from merely regurgitating material. In the words of Rousseau, “If you ever substitute in his mind authority for reason, he will no longer reason.”<sup>27</sup> In context with what has been said, the idea here is that if we allow learners to be merely retentive, just taking in what their ‘teachers’ (in a broad sense of the word) say to them, it will inhibit them from having a ‘critical consciousness’<sup>28</sup> about the world and thoroughly reason with new information as it comes. Similar to *Émile*’s tutor, teachers need to consistently “...ask leading questions and contrive experiences which will increase the efficiency and frequency of the lessons *Émile* will draw from his experiences...”<sup>29</sup>. The important lesson primary educators must take from Rousseau is that in teaching something new we must also provoke students to fully reason through material and consider its relation to other information in their framework. Therefore, it is the teacher’s job to come up with the right questions and examples that will account for well-known misunderstandings as well as test the boundaries of the new information being given.

Having looked at teaching critical thinking through the lens of a Rousseauian tutor, I would now like to highlight the lesson we can take from Dewey when attempting to teach creative thinking skills; however, first it is necessary to mention why it is I distance myself from a strictly Deweyan style of education. The Deweyan tradition (as represented in, say, modern

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<sup>27</sup> Rousseau, Jacques Jean. *Émile*. Trans. Bloom, A. Basic Books: 1979. New York, NY. Pg. 168.

<sup>28</sup> For more on the idea of ‘critical consciousness’ look to Paulo Freire’s *Educating for Critical Consciousness*. The general concept is merely for a person who thinks about his or her world in a critical or analytical manner and not just taking everything to be as it appears or is given.

<sup>29</sup> Phillips, D.C. “Theories of Teaching and Learning. Pg. 236

Montessori schools) of education follows the ideals of a child-centered curriculum<sup>30</sup>. Once again, I take issue with the thought of ‘naturally developing’ a child’s learning process without spending time teaching them good learning tactics. If the child-centered curriculum were supplemented with a structure that ameliorated learning development, my issues with it would be less severe. Another place of separation I take with Dewey is his intense pragmatism about learning.<sup>31</sup> While I think it is important for us to give the students a chance to engage with educational material in a practical manner, too heavy of a focus on the pragmatic aspects of learning may preclude dynamic mental development of the student. Assuming that we give students the ability to learn correctly, it should merely be a matter of the student’s choosing which practical skills they would *like* to learn subsequent to finishing their primary education. It is not the case that I think using practical methods for learning are not *helpful* to the educative process, but to view the implementation of practical skills as a goal in itself seems to be more worthy of a student who has already been trained in learning and can choose the practical skills she would like to utilize. The point is to keep Dewey’s main view of practical training as a method for teaching students how to learn and think without fetishizing the role of practical abilities in education.

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<sup>30</sup> The ideology of a child-centered curriculum comes from the lesson that I did not take from Rousseau. This type of school would like the curriculum to be open-ended based on the needs, wants, and interests of the student rather than having a mapped out curriculum prior to their entrance into the school system. For more on possible problems with this outlook for see Alan Ryan’s article *Deweyan Pragmatism and American Education* (see full citation below)

<sup>31</sup> Dewey believed, “All children were to acquire practical skills, as a moral imperative, even if only some of them would earn their living by using them.” [Ryan, Alan. *Philosophers on Education: New Historical Perspectives*. “Pragmatism and American Education”. Rorty, Oksenberg Amélie (Ed.). Routledge: 1998. New York, NY. Pg. 399]



Pairing a practical exercise with newly acquired information is the first step in bridging the gap between training students to correctly think about information and them actually *doing* something with it. Being able to solve an existing problem or come up with an original idea later in education will be highly reliant on the student's flexibility in using the information they have already been taught. Much as Dewey would have liked to suggest<sup>32</sup>, in order for a student to take that next step in adapting their already existent framework to the nascent piece of knowledge, they must make use of the information through creation of a project or completion of a practical task. This will not only aid students in having a complete understanding of the new information, but also provide the teacher with the ability to critique their knowledge through this manifestation.

More explicitly, the two reasons why we should be concerned with immediately assigning a creative activity to a student: a) ensuring that the student follows up critically thinking about the information with an actualization of it; b) opening up paths for teachers to assess the learner's progress by locating misuses of knowledge and criticizing these mistakes. Regarding the former of these two reasons, I would like to borrow a quote from Alan Ryan to highlight the relationship of this idea to Dewey's view of a practical education:

Of course, children must learn something in particular, of course there was a particular direction in which they needed to be led, and so of course they needed to master the disciplines of learning; but to master anything [for Dewey] in such a way as to have really been educated by it was a matter of absorbing it and turning it to one's own purposes...<sup>33</sup>

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<sup>32</sup> As Ryan said about Dewey's beliefs about learning something new: "Dewey insists always and throughout that acquiring information is incidental to problem-solving." [Ibid. Pg. 404]

<sup>33</sup> Ibid. Pg. 402

It is the transition of dormant, memory-based knowledge to mastery of what is being learned that Dewey sees happening during the hands-on exercises.

In regard to the latter reason, it follows from the idea of an immersive curriculum that we must be reinforcing behavior that exemplifies correct understanding of the knowledge. Though it would be impossible to train students to recognize every instance where it would be helpful to bring a specific piece of new information into mind, with any luck, creative activities will begin to burgeon the ability to recognize when a piece of information is relevant and how to use it in a variety of contexts. These exercises are not only bolstering the knowledge constructed in the current lesson, but also related concepts.

First having looked through ideas passed down from other philosophers about education to make salient the need for an education that primarily aims to teach our youth *how* to learn, I then provided a heuristic for classroom behavior in an education with this aim. Once again, this should set up a pattern students can conform to in order to begin taking on the skills required for proper learning. The form of this mechanism should look like this:

1. We provide the student with the crucial facts about the subject matter that is being taught. This is the mere retentive part of the educative process where we literally pass on slabs of information to the potential learners.<sup>34</sup>
2. After having provided the student with the basic information, we then begin the process of provoking a critical analysis of the information. This should allow the student to be sure they can identify the information properly, understand its importance within the broader system of curricular concepts, and, most importantly, ensure we rid any

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<sup>34</sup> As the educative process moves along, we should begin to see, qua learner, engagement with these facts becoming imbued with the skills being taught in 2 and 3.

fundamental misunderstandings of the new information before they can infect a student's ability to learn later on down the road.

3. Using this newly analyzed information we then assign the student a creative activity in which to use it. We do this with hopes of completing the process of fully understanding the information as well as training the students on different ways they can manipulate the new information for their own purposes.

This classroom process plays a functional role in the act of educating students by driving them through the curriculum. Nevertheless, it is not enough that we have this mechanism, but it is only going to be effective if the larger educational scheme in which it moves is well constructed. This is why the following chapter will move on to the conceptual framework that we must place this mechanism in for its success. This will involve explaining how we should connect up concepts, why concepts must be taught using multiple methods to complete the connections, and the impasse students will face if teachers set things up otherwise. So now that we have built the machine let us move onto the environment in which it runs.

### 3.0 LEARNING, CURRICULUM, AND EDUCATIONAL CAPACITIES

The natural progression from the last chapter seems to be a deeper view of what a “learning how to learn” system means to the mind of a learner and how to construct a curriculum for her. Thus, the motif of this chapter will lean on the side of the meta-conceptual. That is, I will focus on discussing the details of the concepts which are important to understanding the proposed system and giving an overarching view of the educational process in which learners will be immersed (i.e. the conceptual system I am suggesting for the creation of a curriculum). In the last chapter I spoke of abilities such as *critical thinking* and *creative thinking* which I would like to make more robust via an analysis of the nature of concepts. This will both aid in understanding those concepts as well as show how I will be using the word ‘concept’ throughout the chapter. Another fundamental aim of this chapter is to clearly present my understanding of learning: how a concept is inculcated into the mind of a student. From this point I will discuss how the notion of ‘conceptual structure’ relates to that of curriculum. Putting into place all of these preliminary points I can paint a much more cohesive picture of my view on how to construct a curriculum while answering the ‘how’s and ‘why’s regarding its relation to the student. Finally, I will touch on an epistemological point as to the kind of knowledge<sup>35</sup> with which this curriculum hopes to endow students.

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<sup>35</sup> I realize that this may be an odd turn of phrase – “kind of knowledge” – but I will also make this clear by providing a description of what could be meant by ‘different types of

### 3.1 CONCEPTS AND EDUCATIONAL CAPACITIES

As is the case with any philosophy, when talking about education I am forced to confine myself to a specific method of representation for conveying my ideas. Thus I will be freely employing concepts like *critical and creative thinking* with the hope that my point is relatively clear to the reader. I open on this point because it is for this reason that I feel it is important that I begin by discussing how it is I will be talking about concepts and conceptual structures, specifically without stepping hastily into many of the ongoing debates regarding these ideas. My goal is to explain how and why I am applying these ideas to education and to provide an introduction to concepts that I am relying on in my discussion.

Concepts seem to be among the most basic things that must be considered when discussing education. Generically, concepts are the objects with which the mind meaningfully comprehends the world. When speaking, writing, or doing mathematics, one is in active engagement with one's conceptual capacities, allowing one to have a conscious representation of what is being expressed. Already I have talked of a concept as an object; however, I should mention that it is an extremely debatable issue whether or not we countenance concepts into our fundamental ontology. For my purposes I will merely assume that concepts are inherent in a mind that thinks meaningfully, and deploy the notion as a heuristic for discussion involving the mental space of students or the layout of a curriculum.

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knowledge' as well as a presentation of my own way of talking about this topic: that there is a *gradation or spectrum of knowing* involved in the understanding of any idea or concept.

Interpreting our conscious thought as taking place in a conceptual space, it makes sense for education to concern itself with the proper expansion of this space by both carefully introducing new concepts and nurturing the growth of previous concepts that are in use.<sup>36</sup> When first teaching a student about volcanoes, we are not only providing them with a new way of understanding a part of the world (i.e. engendering a new concept), but also providing content to concepts that are crucial to how volcanoes fit into a larger picture of the world (plate tectonics, geography, etc...). Without going too far into a general discussion on concepts, I will point readers towards the direction of Gottlob Frege, specifically his works *Function and Concept*, *On Sense and Reference*, and *Concept and Object* for what I see as the most complete account of what philosophers call concepts.<sup>37</sup>

From what has been said, it should be getting clearer how growth of one's knowledge would be sloped in accordance with the capacity to adjust this conceptual space fluidly with the introduction of new information. This is why it is worth talking about the curriculum as a conceptual structure because it acts as the architecture that undergirds the expansion of knowledge. Prior to officially embarking upon the topic of a curriculum, I would like to touch on the faculties of *critical and creative thinking*, which fall under the category of what I will be calling 'educational capacities'.

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<sup>36</sup> I have here taken on a contemporary view regarding what it is to know something where knowledge claims are understood as moves within the space of reasons – a conceptual arena that is the nature of meaningful thought. For a fuller understanding of this topic see: Sellars, Wilfrid. *Empiricism and the Philosophy of Mind*. Harvard University Press: 1997. Cambridge, MA.

<sup>37</sup> For a well-expressed précis to how philosophers modernly think about concepts as well as the view which most closely represents my own look to Robert Brandom's breakdown of concepts in his work *How Analytic Philosophy Has Failed Cognitive Science*.

Educational capacities are the active learning processes that must, in some sense, be in place for the understanding of new concepts.<sup>38</sup> In the past chapter I talked of critical and creative thinking as being the central abilities for proper learning. Critical thinking entails one's abilities to question the validity of new information, gauge it in light of one's related knowledge and beliefs, and carefully fit the information into a larger picture of the world. I will use the example of a student being given a lesson on expressionist painting: while the student takes up the new information and becomes comfortable with the concept *expressionist*, a further process should be taking place—that of asking why this sort of painting is called expressionist painting?; How does it differ from, say, impressionist painting?; What sprouted this style of painting?; Does it make sense in the historical progression of art? The ability to be critical is crucial to achieving a full understanding of a concept, mostly because the critical process aids in preventing *misunderstanding*. Critical thinking is an ability that is centrally engaged with during the uptake of information, and thus can be thought of as having its arrow pointing inward. Being slowly ingrained with a more polished critical mind should affect the way new information is processed and organized. On the other hand, creative thinking is an ability whose arrow points in the opposite direction, as it is central to the *application* of knowledge. Once the mind is furnished with a new concept it is only through active utilization of this thought that it can be fine-tuned and its understanding can progressively come to fruition. As I will soon discuss, it is only through the *use* of concepts that one can truly be considered to have understood the concept. The ability to think creatively will provide a learner with the capacity to manifest the knowledge that

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<sup>38</sup> It is reasonable to believe that there are certain *a priori* capacities that allow for the development of conceptual thinking, though I am more interested here in the abilities that are crucial to the refinement of conceptual thought qua an inaugurated conceptual thinker. At the very least, these abilities would first come on the scene during the nascent phases of self-conscious thought.

is being gained, and, recursively, understand it better. Thus, these two educational capacities are ones that students must become familiar with in order to properly learn how to learn. Educational capacities are a part of the learning process that must be taught to and developed in students, but must be integrated into the curriculum rather than taught like a concept as they do not have content in the same way a concept does.

It is important to have a firm grasp of what one is erecting and cultivating in a child's mind before talking about how to do so. Just as there is a daily process of introducing new and testing old concepts there is a paralleling process of holistic growth of the conceptual structure that is one's thought. The concept of *rain* does not sit alone in a vacuum, but instead is intimately tied to the concepts *water, evaporation, clouds, rain cycle, etc.* The point of mentioning the idea of a conceptual space or structure is that as I begin to talk about building a curriculum it is crucial to realize that I am not only focusing on the manner in which we introduce individual ideas, but also how they appear on the larger scheme of concepts being taught. A teacher's hopes of successfully teaching any single lesson or topic will have a dependence on what the state of the entire edifice is (i.e. the concepts that are in place prior to teaching a lesson). Therefore, one must be tactful in choosing the progression of a curriculum or else individual concepts may be left malnourished by the lacking ability of the student to place it in the broader context of concepts on which it relies.

### **3.2 LEARNING**

Following from the philosophical standpoint I am taking regarding the mind, thought, and knowledge, borrowing considerations from a model of language learning comes as a natural way



to begin considering the nature of learning. It is generally accepted that the ability to learn a language, or perhaps the ability to think, comes concomitantly with the ability to follow certain rules or norms.<sup>39</sup> In the tradition of the later Wittgenstein, one may say that learning a concept is like learning how to make moves within a game.<sup>40</sup> Educators can take important lessons from this analogy and see that, even in our earliest stages, knowing something is not as simple as having memorized some data. Learning is a two-part process (though I should mention the two ‘parts’ here are intimately tied together) where the learner is guided into having the correct mental state regarding a concept and then begins to use the concept. It is through the latter stage of concept use that the mental state mentioned in the first step can be recognized externally, and thus criticized and fine-tuned. Very much like learning to make a move in a game, it is impossible to correct a learner’s ability to play the game (or follow a rule in the game) without having an instance of their understanding to hold up for criticism (i.e. they have to attempt a move before we can correct it).<sup>41</sup> Even further, as is also emphasized by Wittgenstein, this is all also dependent on the learner being able to correctly play the broader game in which the concept is a part.<sup>42</sup> Before traversing anymore ground on this topic, I will point out that the language

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<sup>39</sup> For a formulation of this idea that is centered on the activity of children (as opposed to the philosophic formulation I will give) see, Piaget, Jean. *Play, Dreams, and Imitation in Childhood*. W. W. Norton & Company: 1962. New York, NY. Specifically chapter eight, “Transition from Sensory-Motor Schemas to Conceptual Schemas”.

<sup>40</sup> See Wittgenstein, Ludwig. *Philosophical Investigations*. Anscombe, G.E.M. (Translator). Prentice Hall: 1958. Upper Saddle River, NJ. Particularly §31-33

<sup>41</sup> This part of the characterization is important for staying true to the ideas of Wittgenstein. To him, having the correct mental state regarding a concept *is* having the ability to use the concept, and thus it is important that these two steps are understood as two parts of one process (i.e. the learning process). Thus, it will only be when proper use is achieved that the mental state is said to be correct.

<sup>42</sup> The idea of understanding the ‘broader game’ is tantamount to the nature of concepts expressed in the last section where concepts are bound together in a logical structure, and thus, require a context in order to be understood.

learning model which I am transposing into the educational realm is not only an upshot of the ideas of Wittgenstein, but also has its foundations set by the writings of Wilfrid Sellars. Particularly, I will be employing a method of analyzing the learning process that is born out of Sellars's paper *Language as Thought and as Communication*.

In an attempt to, "give a naturalistic interpretation of the intentionality of conceptual acts,"<sup>43</sup> Sellars sets out a way of understanding the process of language learners adapting to the norms of linguistic behavior. Though this thesis is targeting education that comes subsequent to the ability to think conceptually, Sellars's explanation of how teaching linguistic rules brings about conceptual activity seems to elucidate more general properties of the emergence of concepts. The salient difference between the two (Sellars's model and the case of a learner who can already think conceptually) is that Sellars focuses upon first uses or first understandings of a concept whereas the child in school will often come across concepts that they have already begun using and understanding. I will talk about possible problems and solutions coming from this after discussing Sellars's learning model.

Sellars begins by discussing the 'categorical ought', specifically "If one is in C, one ought to do A"<sup>44</sup>. Where here C is a circumstance and A is an action. Basically this is a generic normative ought where there is a particular rule or norm that goes along with some situation exemplified by an action. An extremely simple example could be that in a circumstance where during a valediction one person extends her hand out toward another, the other ought to correspond by shaking her hand. However, Sellars is aware that to talk about these kinds of

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<sup>43</sup> Sellars, Wilfrid. *In the Space of Reasons*. "Language as Thought and Communication." Brandom, B. Robert, Scharp, Kevin (Eds.). Harvard University Press: 2007. Cambridge, MA. Pg. 57

<sup>44</sup> Ibid. pg. 58

norms presupposes *some sort*<sup>45</sup> of conceptual recognition, and thus cannot be the starting point for talking about conceptual understanding.

It is here Sellars employs a specific method for representing the approach to teaching linguistic norms - making use of his contrast between *ought-to-be*'s and *ought-to-do*'s. The *ought-to-be* is in reference to a mental state and is a way of explaining that the learner must have a particular form of thought that is akin to our communal ways of representing the concept at hand. However, it is important to note that conceptual recognition is not necessary for the learning process to begin. To begin with the learner is not viewed as attempting to follow any norm, but rather is merely in some mental state that must be criticized through actions that provide content for the critique. This should become clearer by seeing Sellars' formulation:

Xs ought to be in state  $\phi$ , whenever such and such is the case

The purpose of such a rule is achieved to the extent that it comes to be the case that Xs are in state  $\phi$  when such and such is indeed the case...Now *ought-to-be*'s (or *rules of criticism* as I shall also call them), though categorical in form, point beyond themselves in two ways. In the first place they imply (in some sense of this protean term) a *reason*, a *because* clause...In the second place, though *ought-to-be*'s are carefully to be distinguished from *ought-to-do*'s they have an essential connection with them. The connection is, roughly, that the *ought-to-be*'s imply *ought-to-do*'s.<sup>46</sup>

The *ought-to-be* having extension beyond itself is an important point for understanding this theory in an educational context. The mental state we are attempting to produce in the student should be connected to a reason. This reason extends the particular concept into the broader curriculum, and has a form similar to, "John *ought-to-be* in a mental state that recognizes

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<sup>45</sup> I italicize 'some sort' here to emphasize that I am not making any commitment to exactly how many of the relevant concepts must be understood in order to follow a norm. Sellars, in my interpretation, is not committed to saying that all relevant concepts must be understood to begin following a norm, and thus I do not stray from him regarding these issues.

<sup>46</sup> Ibid. pgs. 59-60

the concept *subtraction* as one that deconstructs the value of one number in accordance with the quantity of another *because* this is a fundamental principle of doing proper arithmetic”. Thus there are reasons why the educator will want John to be in a certain mindset when engaging with the concept of subtraction so as to avoid misunderstanding as the class moves forward to ask him to apply it correctly. From what I have just said I hope it is also clear why it is appropriate to call these rules of criticism. As an instructor begins teaching a concept and, subsequently, as the students show their understanding of it, their uses will point back to their mental state regarding the concept and allow the instructor to criticize and reorient the student for further attempts at utilizing the concept.

Now returning to Sellars’s explanation of teaching linguistic norms, he highlights the importance of the ought-to-be *for* the ought-to-do:

Now many rules of language *are* ought-to-do’s thus,

(Other things being equal) one ought to say such and such, if in C

and as such they can be efficacious in linguistic activity only to the extent that people have the relevant concepts. It is therefore of the utmost importance to note that many of the rules of language which are of special interest to the epistemologist are ought-to-be’s rather than ought-to-do’s.<sup>47</sup>

Here he begins talking about the ought-to-do’s, being keen on stating that in order for the ought-to-do to truly be demonstrative of some rule or norm, the relevant concepts must be in place. In an educational realm, we can think of this as being analogous to our expectation for a learner to apply a concept correctly only once she has an understanding of the relevant concepts that will allow her to properly utilize it in its appropriate context. His mention of the epistemologist’s interest in the ought-to-be’s has content in the educational context as well: the

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<sup>47</sup> Ibid. pg. 61

ought-to-be's are actually of primary interest to teachers -it is what is under scrutiny when we evaluate a student.<sup>48</sup>

A quick breakdown and interpretation of what I have from the Sellarsian theory is this:

- a) Teacher T strives to teach learner L concept C
- b) T must ensure that she has covered the appropriate material with L in order to properly understand C.<sup>49</sup>
- c) T introduces basic information about C in the introductory phases of a lesson.
- d) T asks L to apply C in circumstance N [the initial ought-to-do]
- e) Use of C in N provides T with content for critiquing L's mental state M about C.
- f) Through this criticism T can re-examine L's M through further uses of C [this process may continue in reverberation for some time]
- g) Once L is accountable for using C appropriately, L can be seen as following the norm and having a correct M in regard to C.

This should ground the Sellarsian theory into a form that is applicable to classroom teaching. The large difference is that teachers are dealing with students who are already thinking conceptually and will have rudimentary forms of many concepts that will be taught in the

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<sup>48</sup> It seems to me that there is a common theme in education systems where, from the perspective of the instructor, push to get a good grade actually provides incentive for students to be merely interested in fulfilling the ought-to-do's as convincingly as possible without actually having achieved the ought-to-be. This topic will be given more examination in the coming chapter; however, this point provides a great formulation of what is a ubiquitous problem in education – students who are well trained at getting good grades rather than learning.

<sup>49</sup> This step should be taken with a grain of salt, as there must be an assumption that only a limited amount of context can be supplied leading up to some agreed upon disposition the learner must have to understand a given lesson. Without out this assumption we run the risk of regression – asking for a full context for every concept, which will never trace back to some 'central' concept from which to start. The point is to not be teaching the U.S. Constitution before having discussed the historical context of the American Revolution.

classroom. This issue will receive some mitigation in what follows in the discussion of conceptual structure in the curriculum. I would, however, like to address one issue that may arise from this difference: assuming a student is a 'blank slate' regarding some concept when, in fact, a well-ingrained one is in use. For this reason it is of the utmost importance that when beginning to teach a new lesson, the teacher gathers some information evaluating the level of assimilation the child already has to the concept in question. One could imagine something as simple as a worksheet assessing recognition of and practical ability with the concept. The main reason for this is that if the student has a serious misunderstanding regarding the concept or, due to a lack of knowledge about related concepts, has confused its use or meaning, it could then be detrimental to the learning process if this issue is not located and corrected as early as possible. For instance, it is common that students may learn math tactics to help them cope with problems in pre-calculus, but these same practices could be quite harmful to their success in learning calculus. An example of this may be a method of solving for limits where one plugs in the number  $x$  is tending toward into the equation to find the limit. This can work, but will give you the incorrect answer in places where the denominator becomes 0 as it is merely a trick and does not actually require fully solving for the limit, which in this case would require the use of L'Hospital's rule to complete the problem.

To be sure I am absolutely clear on how I am using this theory of learning and its applicability to education I will step through an elementary school<sup>50</sup> lesson on gravity. In doing so, I am going to be connecting ought-to-be's, from the perspective of the teacher, to the

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<sup>50</sup> I indicate that it is an elementary school lesson so that it is no surprise that I do not provide any mathematical derivations of the inverse property of distance to gravitational force or the 'how's and 'why's for treating a massive object as a point vs. integrating over its shape.

educational ability of critical thinking, from the perspective of the learner, and *mutatis mutandis*, the ought-to-do's will be coupled with creative thinking.<sup>51</sup>

One last point to mention is that I will be taking into consideration a point that comes from Dewey's *Experience and Education*. He believes it to be crucial that when organizing subject-matter for students we choose objects that are within the realm of that child's world. Just as it is ridiculous to teach an infant still learning to walk to use a lawn mower, it is also ridiculous to teach a first grader how to file a tax return. This way students can actually take the knowledge they gain and directly integrate it into the way they interact with the world.<sup>52</sup> I mention this now because I will soon be suggesting that concepts such as *forces* and *fields* should be taught in elementary school. I am anticipating an objection to my explanation of how gravity could be taught will be that the instructor is precluded by the inability to have taught the relevant concepts beforehand. Especially someone who is considering the Deweyan point may say this is pointless subject matter for elementary students. I, however, argue quite the contrary: the idea of a force in nature or an unperceivable field seems crucial to basic development of scientific intuition.<sup>53</sup> Moreover, the objects of familiarity required for this lesson are as simple as TV sets, rocks, chairs, magnets, or, perhaps the most complex would be, a model of the planets.

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<sup>51</sup> I am not saying that there are not separate ought-to-be's and ought-to-do's that are involved in teaching the students the educational abilities of critical and creative thinking; instead, I am suggesting that the student's ability to conform to the ought-to-be of a particular concept is a 'test' of their critical thinking ability whereas complying with the ought-to-do seems to be a use of their creative thinking ability.

<sup>52</sup> Dewey, John. *Experience and Education*. Touchstone: 1938. New York, NY. Pg. 81

<sup>53</sup> This should not be interpreted as me wanting an eight or nine year old to be learn about vector fields, but rather that there should be some introduction to the basic concept of force, or magnetic field. I do not see this as implausible as it does not seem beyond an eight year old to understand the underlying concept explaining what I do when I push a chair or what pulls one magnet to another.

The starting point of the lesson would be a test of the concept of gravity to identify prior misconceptions of the concept. This preliminary exercise can also be used to ensure that the student has retained knowledge from relevant lessons that led to this one. So from a meta-conceptual level we make the assumption that either the students basically have no concept of gravity or that they began developing the concept, but that it is not properly refined. This opening test is very specifically directed at locating any wrong notions that the teacher needs to be careful not to develop. The test could be something as simple as a 5-question worksheet (which could even be completed the day before the lesson is taught – giving the instructor time to consider what she must be careful of) asking some fundamental questions about gravity. A sample structure could be:

1. Why do you naturally stay on the ground?
  - a. Everything naturally falls
  - b. Gravitational pull is created between me and the Earth
  - c. Because we need the ground to walk on
  - d. Everything moves towards the Earth
2. Why does the Earth orbit the Sun?
3. What causes gravity?
  - a. The shape of the Earth
  - b. The size of the Earth
  - c. The mass of the Earth
  - d. The atmosphere
4. True or False: The farther you move from the ground the stronger you are pulled back toward it.



5. Just as you get pulled toward the Earth, do you pull the earth towards you? Explain your answer.

This simple test searches for many of the common misconceptions about gravity and also gives the teacher an idea of what the students' intuitions are about the concept. It should be stressed to the students that they are not being evaluated based on how they answer, and it is fine not to know any of these answers. If this test is given a few days prior to beginning to teach the material, the answers can play a determining factor in how the material is approached. Having gathered information from this original test, the first goal is to integrate the initial ought-to-be criticism into the lesson plan. Perhaps the first section of the lesson is to teach that gravity is a force between massive objects. The assumption here is that these two concepts, *force* and *mass*, will have been introduced in a preliminary lesson. Thus, to begin with the teacher should draw out the connections between the introduced concepts of *force* and *mass* and the one in our sights - *gravity*.<sup>54</sup> From here the lesson can take off allowing the teacher to lecture on this initial conception of gravity, carefully guiding the students past the misconceptions that were identified. As talked about in the previous chapter, upon having presented the basic facts about gravity and then showing some examples, the process of critically evaluating the students should begin. This can both be seen as the ought-to-be (based on the initial information gathered regarding how the students are thinking about gravity), and also as patterning the students to use a critical thought process when engaging with new concepts.

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<sup>54</sup> This will involve tracing out the similarities and filling in the gaps between what was taught of these concepts and how they apply to gravity. The teacher may have introduced *force* by pushing a chair around, letting students be under it to show that the chair and ground are both producing forces, or even having shown the actual pull of magnets toward one another. She can then remind the student of these exercises and relate them to the force of gravity.

It is important to now make a distinction between the questions that force the student to critically engage with the concept and those being asked by the teacher to test the students' ability to critically think. During the first few years the teacher can pattern the student to ask certain questions about the material, then as time elapses she can ask things like, "What might you be misunderstanding about gravity? List other ideas from science that relate to gravity. How might you test the theory of gravity when you get home?" In this way the teacher can begin bridging the gap between merely providing the students with the right questions and seeing how those questions are affecting their critical thinking capacities. Now the long-term ought-to-be regarding the critical ability of the student can be criticized. To clear up any confusion regarding the 'criticizing of critical thinking', it is simply the process of teaching students to be their own criticizers. In some sense, they should begin to be their own trainer regarding new concepts. Gradually giving them control over the ought-to-be's as they slowly see the results of their actions and seek out further information to improve their understanding is, in essence, giving them the ability to teach themselves new concepts and is the crux of teaching critical thinking.

Moving back to the lesson itself, the fundamental content of the concept gravity has been introduced, and now as the lesson ends one should spend some time making the appropriate connections in the larger scheme of the curriculum.<sup>55</sup> This could involve teaching gravity as a mathematical concept (explaining the universal constant  $G$ , the formula used to explain the gravitational force, etc), explaining that gravity also has a potential force, practical applications of the gravitational force, what weight is (why you weigh less on the moon), etc. Again there

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<sup>55</sup> Based on the lesson plan the teacher is using this may be done directly after the initial lesson or throughout the rest of the day if it is more appropriate to introduce these connections within lessons from other subjects.

will need to be a critical evaluation that the class must answer to test whether or not they have properly made sense of the concept in the broader context. A tangential point about educating in this manner is that the overall need to cram in an abundance of new material into a school day should become less of a struggle. Since every lesson is in some way a lesson about many other ideas, a single day may only have four different topics while engaging with the same amount of material as a day that jumps to a new subject each hour.

Once the teacher believes the students are thinking about the concept correctly it is possible to begin watching the students follow the ought-to-do's through more purely creative assignments. In actuality the ought-to-do's have been going on during all of the critical analysis. Though, as Sellars has properly emphasized, until they have mastery of the concept it is not correct to actually view them as trying to follow the norm. At the point that the teacher believes the student to be well suited for proper use of the concept, then a large-scale creative activity should be assigned. This could be more practical: How much would you weigh on each different planet in our solar system? Then show how the change in weight corresponds to the change in planetary mass. Or it could be more abstract: Imagine you're an alien with the ability to create planets. Create your own planet, explaining how gravity would feel and discuss through a picture or story what it would be like to live on that planet.

The latter of the two activities seems to be the far better one as it has the possibility of forcing cross-disciplinary thinking and can provide better content for criticism on the other long-term project of teaching creative thinking. I mention both to show that what I am calling creative thinking is not *necessarily* abstract and can be found even in more practical settings like a mathematics class. In either case, after the creative activity is turned in the teacher should be able to make a concluding judgment on where the students are with the material and what may

need reviewed or expanded on before a more comprehensive evaluation like an exam or project is given. The students who have shown a strong understanding can be left to move forward on their own with use of the concept; whereas, those who did not show competence with the concept could be worked with while the others do one of the creative activities. The creative assignment could then be given to these students as homework for that evening.<sup>56</sup>

It is important to this entire system that we do not merely rush students on with new material until old material is properly understood. This theory of learning is appealing because I believe it sheds light on a problem that is often not thought about: we begin to ask students to use concepts, in an evaluative manner (i.e. on a test or a graded assignment), before they even truly have the concept. Moreover, we often ask them to move on and make use of the concept in a further lesson before they have come to properly understand it. The linguistic behavior model makes this point obvious, as we would not expect a child to verbally identify a 'red apple' in contrast to a 'green apple' if the child is not even accountable for proper use of the word 'red' yet. Similarly, in school we do not want to ask them to make official<sup>57</sup> use of classroom concepts until we have given appropriate time for assimilation to the correct use of the concept. If not, we are only recursively solidifying an incorrect way of thinking.

Finally, having discussed how an individual concept is learned, I can now move on to talk about the structure of the curriculum from a broader vantage

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<sup>56</sup> This method of assigning homework would be worth some separate exploration as it may allow us to minimize homework by maximizing use of classroom time; however, homework that is assigned is only done in areas that are deserving of further attention from the student. If a disparity forms where a group of students are not getting any homework (which may be perceived as unfair by other students) then some short advanced assignments could be created for them to work on as well.

<sup>57</sup> I use the word official here to demarcate my meaning that they are using the concept on a test or in a real world setting and not still in the stages of practicing through classroom exercises.

### 3.3 CONCEPTUAL STRUCTURE AND THE CURRICULUM

The above layout for a lesson plan may have left an impression that I have unbelievably high expectations for the level at which students should be at from a young age. I hope that it will now become clearer why I inserted concepts like *fields* and *forces* into an elementary school lesson. This will require me to link back up with the idea of conceptual structure that I had brought up earlier in the chapter. The notion of conceptual structure is intimately tied to my view of a curriculum. It can be viewed as a web of concepts that grows outward beginning with some foundational concepts. So perhaps it was quixotic of me to believe that elementary school students would have learned about fields and forces, but I lay it out in this way because I see those concepts as playing an important role in one's understanding of gravity.

Many things must be discussed in arguing how to structure a curriculum: how do we choose what subject matter is of enough privilege to be in the curriculum?; how do we make the curriculum accessible to different types of learners?; what is the difference between the curriculum I am suggesting versus any other method? To begin with I will not address these questions individually, but will leave them hovering in the distance while I begin my discussion of the fundamental aspect that allows a curriculum to be thought of as analogous to a conceptual structure: connection.<sup>58</sup> When talking about a structure of concepts, we are talking about something like a web or array of concepts where each individual concept in the array is logically dependent on every other concept. From the standpoint of a curriculum, lessons cannot be thought about in isolation. Rather, individual lessons must be planned in accordance with what

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<sup>58</sup> I should mention here that the type of curriculum I am arguing for is categorically a 'constructivist' curriculum. The idea of connecting and building up structures of knowledge has been a pervasive theme in the constructivist literature and I hope to be adding to that already rich discussion.

has already been taught and what will be taught. Concepts must be connected up with their relevant counterparts. Looking at a single classroom lesson, in isolation, one should imagine that we are not only teaching a single concept, but also bridging the gap between that concept and branches of other concepts that have been left dangling, along with sprouting more branches for later linkage.

The idea of connection as priority in curriculum building follows from my desire to prevent fundamental misunderstandings that plague subsequent learning. One example from my own experience in teaching physics is that most students who are having a hard time solving torque problems are not really struggling with torque, but instead never fully filled the gulf between the spatial, mathematical concept of a vector and that of a physical force. The misunderstanding about vectors precluded the student's ability to engage with the new material. Again, in economics students may have a hard time solving competitive game strategies. Once concepts like marginal cost, price, quantity, and total cost are established this kind of problem solving becomes almost formulaic. However, most students I have come across are struggling with these problems because they do not truly understand marginal cost. I realize these examples are anecdotal, but I am trying to get a more general point across – learning often becomes stunted due to the misunderstanding of or inability to use prior concepts.

My solution to this educational issue is that we structure the curriculum in such a way that we do not leave gaps between knowledge that should obviously be connected. Coming from the example above, the student should not have moved on to Newtonian force diagrams until she properly understood vectors, or at least should have realized that she needed to go back and practice vectors upon reaching this issue. Obviously in college the pace of classes is much faster allowing these problems to become more ubiquitous. The problem here seems to be how we

trained our students in the first place. Had they been trained to make sure they are connecting new pieces of knowledge together with old pieces it would have been simpler to realize upon first attempting to do a Newtonian Force problem that the past idea of a vector was what was preventing their progression with the material. In primary and secondary schools the curriculum should be structured to minimize the possibilities of these problems. By making sure that the prior relevant concepts are in place before teaching a lesson and ensuring the progression of the curriculum constantly incorporates past material it should become easier to catch misunderstandings as they arise.

Towards the end of the chapter, these thoughts about curriculum will make more sense in conjunct with the idea of ‘different senses of knowledge’ about a concept. I will be arguing that there are different levels of knowing something, specifically that there is a notable difference between knowing *that* something is the case and *why* something is the case. A curriculum of this style hopes to provide learners with the latter of these two; rather than merely memorizing facts in isolation, concepts are taught (and, in turn, put together) in a schematic way.

To construct a curriculum requires one to identify the basic concepts behind a primary and secondary education.<sup>59</sup> This should not be seen as a slip into educational essentialism, but a necessary setting of foundation to a structure that is to be built and filled in. At the same time, it is important to recognize that setting foundations for knowledge is, in a manner, fixing the curriculum’s trajectory in certain facets. How material is presented and, subsequently, the way students’ piece together knowledge can be affected due to these starting points. Thus, subject

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<sup>59</sup> I have no intention here to argue for what these basic concepts should be. The content that would fill this sort of curriculum is up for grabs. I merely want to give an example of how content would be structured once it is chosen.

distinctions should be made with care and an eye toward the future progression of student knowledge.

First, one may start with some key subjects from which we can pick our concepts. Commonly, mathematics, natural science, English/ language arts, social studies (which includes history at first), and the creative arts (normally music and art for primary schools students) are the chosen subjects (but these drawn lines are fairly arbitrary in my eyes).<sup>60</sup> Of course, all of these subjects will eventually branch into their own subsets of subjects (e.g. natural science breaks up into physics, chemistry, biology, geography, etc.) and then branch even further into hybrids of these subjects (e.g. psycholinguistics). Regardless, this cascade of forthcoming subjects and concepts needs a place to begin. To exemplify how I see this process working, I will step through the progression of a sample mathematics curriculum functioning in this fashion.

In this example mathematics course I will begin with the concepts *number* and *space*. The aim is to teach students the correct way of thinking about these concepts with the want to move on to the concepts *addition* and *subtraction*. To begin with the teacher must choose lessons that primarily use these concepts. Perhaps a good lesson to start with is the number line. To provide more content for the students' understanding of numbers, visual models of the quantities each number stands for could be helpful. Thus, the next lesson may be counting apples, paperclips, or some other familiar object. As the students develop the basic ability to understand what a number is the teacher can move to exercises about spaces. With any luck, this lesson will help abstract the concept *number* from the objects on which they were counting (the number line, fruits, etc.) and burgeon their understanding of numbers as non-concrete, abstract

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<sup>60</sup> Going a step further, some people have gone as far as suggesting that we completely break down the borders between disciplines. For more on this idea see the works of Sir Ken Robinson, particularly his speech entitled "Changing Education Paradigms".



objects. This could be done by giving the children putty, and first calling the putty the ‘space’ from which the numbers come. Then the children can create quantities and count by pulling distinct, smaller balls of putty out from the larger space. Lessons in fractions using the ‘putty space’ may be helpful to allow the children to see how this space can represent numbers in countless ways. Eventually as the children gain the ability to count and create spatial quantities the teacher can begin to introduce *addition* and *subtraction*. Now the teacher should be in a great place to teach these concepts as addition and subtraction using ‘putty space’ should be a smooth transition in conjunct with the ability to count.

It is worth mentioning here how one may begin incorporating this lesson into the larger expanse of the curriculum. As these concepts are being taught it would be a useful to talk about notes in music as numbers are often used to aid students in mapping instruments to sheet music. Also, a history lesson could be given about our number system in comparison to the Roman number system.<sup>61</sup> The idea of space can tie back into science when teaching the concepts *space* and *mass*.

There is a current method being used in education theory that is a great fit for educators wanting to construct a curriculum in this manner: concept mapping. These are diagrams that are used for a number of reasons to make explicit the relationships between concepts.<sup>62</sup> They can be

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<sup>61</sup> It is worth mentioning here that my take on history as an elementary school subject is that it can be left out of our curricular structure. History appears to me to be best taught in context with other information rather than as a separate timeline of events that sit outside of the other lessons. I see history for young children as a way to enhance new lessons using stories that explain the places in time from which the information came or to highlight when these concepts were important to humankind. This would probably make it important to have civics, social studies, and politics classes enter the curriculum earlier.

<sup>62</sup> For an applied view of concept maps cf. Afamasaga-Fuata’I, Karoline. *Concept Mapping in Mathematics: Research into Practice*. Springer: 2009. New York, NY. Or, for a more general understanding of how concept maps work cf. Novak, Joseph. *Learning, Creating, and Using*

used in a very focused view where one maps the relationships between *clouds, rain, evaporation, heat, and water*, or they can be used on a higher level to map out the relations between concepts in physics and chemistry. These provide a visual for students to see which concepts they should be considering together and an elaboration of the ‘whys’ that systematize a group of concepts into a cohesive lesson (e.g. the rain cycle). Not only this, but building a concept map can be used as a practical assignment to recap information as topics begin blending together, allowing the teacher to see how the student has pieced together a set of concepts.

Something that may be looming on the minds of anyone reading this is, “Since these students already come into the first day of school with a particular way of thinking, how do we ensure that the logic behind the curriculum easily fits in with this predisposition? Moreover, what if the two are entirely incompatible?” This is a serious concern for a theorist who may be planning a curriculum using this method. Many students come in with a proclivity to use numbers as opposed to words or to see colors more intuitively than shapes – this list could go on forever. The question is: how do we mitigate this worry of building a curriculum that is not applicable to the various types of learners?

Since there is no way to peer into the mind of a student and discover the best way to teach her; instead, we must teach with some variety. In other words, educators should be teaching concepts from a number of different standpoints in hopes of striking a note with the assorted abilities of students. This is a method I will call teaching for ‘rounded concepts’. I use this term to suggest the imagery of a conceptual web where the concept is sitting in a bubble connected to many other concepts. Then, the word ‘rounded’ suggests that we are attempting to

get at the concept from all of the different connections around the bubble. Teaching in this manner exploits the interdependent nature of concepts. I see it as a very natural method coming from a curriculum that is supposed to be founded on a logical structure. It is also a necessary strategy if we as educators are to take seriously the fact that each student will have a different disposition for learning, while still wanting them all to engage with the entirety of the curriculum.

Of course teaching rounded concepts will come concomitantly with connecting up concepts across disciplines and critically evaluating different aspects of a newly taught concept. The important task here is for teachers to be considering the different proclivities of their students. If we want students to remain relatively close to one another regarding the different subject matter we need to employ approaches that cover a broad range of learning styles.

For an example of this, let us consider teaching vectors (i.e. Euclidian arrows on a coordinate plane) to a group of students in the later part of a science curriculum. Vectors have an abundance of uses across disciplines, but generally are ways of representing quantities such as velocity, force, distance, etc as a spatial arrangement so as to make analysis simpler or, in some cases, practically possible.<sup>63</sup> For students who have a strong disposition to think spatially, teaching vectors graphically and then applying the concept to a physics problem may be enough to impart the concept correctly. Though, for students who are more inclined to work with words, often the mathematical method never quite makes connections to many of the important

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<sup>63</sup> In order to not peeve any mathematician readers, I should mention that outside of this use, a vector has a more general use as a mathematical object that has a well-defined direction and magnitude, and, in their computation, must satisfy a list of vector field axioms. This would further opens up talk of vector spaces and fields as important concepts to be discussed, but I will stick with this basic application of vectors as they are used in introductory physics.

applications of a vector (e.g. doing a cross product). This is where teaching for a rounded concept becomes useful. Rather than a strictly mathematical method of teaching vectors it is possible to introduce a lesson on vectors using more general descriptions. For instance, explaining that in the same way you can describe the movement of a ball or the distance a desk is about to the top of my knees," - numbers are doing a similar job. Instead of talking about the baseball we are taking certain features of its movement to make a mathematical reference to what we want to communicate. A set of exercises devoted to transposing verbal descriptions into a vector analysis may be quite helpful for certain students. A student who spends a lot of time using computers may understand matrices much better than graphs. For them doing vector analysis by writing vectors in matrix form may be helpful. By means of different applications we can also use vectors to show music students how to map features of sound into a vector space, or during the creative exercise allow a more artistic student to draw out some of the complex graphs that come from vector analysis. Then, hopefully, by doing something she is good at while also making use of the concept of a vector we can provide many different types of learners with the proper concept.

As a point of further development to the question, "why this curriculum over any other?" I would like to close on an epistemological note about the sort of knowledge this kind of curriculum is harvesting.

### 3.4 TYPES OF KNOWLEDGE AND CONCLUDING THOUGHTS

One of the major shifts in epistemology can be unpacked out of a quote from Wilfrid Sellars's *Empiricism and the Philosophy of Mind*: "The essential point is that in characterizing an episode or state as that of *knowing*, we are not giving an empirical description of that episode or state; we are placing it in the logical space of reasons, of justifying and being able to justify what one says."<sup>64</sup> I mention this because it has been very influential on an epistemological distinction I would like to make which I will be calling the 'that/why distinction'. In the above quote Sellars is in the midst of his book-length attack on the idea of 'givenness' in philosophy. Here specifically, he is pointing out that to know something is to be able to justify what one knows, giving expression to reasons that fortify one's claims. This point speaks to me far beyond the intention Sellars had, and extends itself into the educational realm by way of thinking about what a student knows.

There is a big difference between knowing *that* something is the case and knowing *why* something is the case. Rote memorization is a very different type of knowledge than knowledge corroborated within a broad context of concepts. To provide myself with a way of talking about these different types of knowledge I have come up with the idea of a gradation of knowledge (or, as I may also refer to it, a spectrum of knowledge). This provides us with a framework for talking about how well a student 'knows' something. All the way from the basic ability to identify an object through its familiar concept to fully integrating a concept into the way one understands and explains phenomena in the world. Even the most amateur philosopher may be able to answer true to a question that states "True or False: Hegel's account of self-consciousness

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<sup>64</sup> Sellars, Wilfrid. *Empiricism and the Philosophy of Mind*. Pg. 76

breaks away from the Cartesian account”. Yet, we would want to say that somebody who can actually provide an explanation for what this change is and why the two systems are different *knows* more than the person who can merely point out the fact. Buddhists, for instance, spend years trying to understand that the self is nothing and I am the same as everything else. However, knowing this Buddhist principle and actually feeling the force of it through years and years of meditation are two far different things to them. I use these examples only to show how in a certain way many people in academics as well as cultural activities already use a sort of spectrum of knowledge to describe the degree to which someone knows something.

The Sellarsian point above suggested this sort of analysis by pointing out to me that we do not think of a child as knowing anything until she can give reasons for what has been said. In this vein, there is a worry of education failing when students do not place knowledge into a broader context and instead just learn facts in isolation. An educational theory backing this up is the currently booming constructivist view of education. Their thesis being that knowledge is not something that can just be handed over to the student in a lesson, but must be constructed independently in the mind of the student using everything else she knows. A recent publication by educational theorist E.D. Hirsch, *The Making of Americans: Democracy and our Schools*, gives an argument against what he calls the ‘anti-curriculum’ movement of progressive education. He instead asks for a constructivist curriculum that actually allows for real knowledge construction by providing the background information and context.<sup>65</sup>

The ideas I have been expounding about ‘curriculum building’ follow in the constructivist tradition as well as with Hirsch’s desire for a real curriculum that can truly guide

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<sup>65</sup> See specifically his second chapter “Sixty Years Without a Curriculum” to see direct engagement with this issue. [Hirsch, E.D. *The Making of Americans: Democracy and Our Schools*. Yale University Press: 2009. New Haven, CT.]

students to a better way of thinking. The gradation of knowing and that/why distinction is helpful for pointing out what a well-structured curriculum would be doing for students. By connecting up concepts and thoroughly inaugurating students into the proper creative and critical processes we can see the knowledge that is transmitted as falling on the higher end of the spectrum of knowledge. That is, students will be constantly engaging with material as it relates in a broader context, allowing for knowledge to be less isolated (not so much knowledge *that* something is the case) and more contextualized (knowledge that is helpful in explaining *why* something is the case). A great quote from educational enthusiast Jerome Bruner after the famous 1959 Woods Hole conference:

...the curriculum of a subject should be determined by the most fundamental understanding that can be achieved of the underlying principles that give structure to that subject. Teaching specific topics or skills without making clear their context in the broader fundamental structure of a field of knowledge is uneconomical in several deep senses.<sup>66</sup>

This exemplifies one of the major motivations of structuring the curriculum in the way I have defended: to actually construct knowledge from its roots so that it becomes truly useful to the further needs of the student. By using the curriculum to pattern proper learning into our youth we can hope to create students who are able to flourish in whatever field in which they find themselves interested. Going back and understanding the rudiments of learning and the structure of conceptual knowledge is the most helpful method I could see for trying to find a theory for how to construct a curriculum. The next set of issues considers how we find and train teachers who can do what is necessary to promote this curriculum and, further, how we evaluate

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<sup>66</sup> Bruner, Jerome. *The Process of Education*. Harvard University Press: 1977. Cambridge, MA. Pg. 31

students' progress in such a curriculum. These will be the topics of my next chapter: teaching and evaluating.



## 4.0 TEACHING AND EVALUATING

The last chapter provided a theory for understanding and building a curriculum. Both learners as well as the curriculum's internal conceptual structure were addressed having hardly addressed the other side of the coin: teaching and the assessment of student progress. My focus will now turn to an examination of the practice of teaching and how to train teachers so as to truly integrate them into this practice. Then, the second half of this chapter will be devoted to setting up standards for evaluation.

To begin with I will look directly into what the practice of teaching must entail in order for it to be both effective and useful in the system at hand. The major point being that the teacher must have a strong grasp of the material that is to be taught in order to be capable of filling the role of a teacher.<sup>67</sup> For a teacher to be able to come up with an organized strategy (lecture, discussion, assignments, etc.), realize students' mistakes (and how to fix them), and prevent misunderstanding, the teacher must have a full<sup>68</sup> understanding of the subject matter.

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<sup>67</sup> While this may seem obvious, it seems to me that more emphasis has been placed on being good with kids as opposed to being a master of your section of the curriculum. Of course the former is important, but if we want school to become more of an educational institute and less of a daycare the latter needs to be taken seriously.

<sup>68</sup> I am going to use these different adjectives like 'full', 'complete', or alternatively, 'master of the knowledge' when I am talking about a teachers' understanding of their subject. I want to now clear up what I mean so that it is not taken as too soft of a claim. My take on 'complete' understanding, in the relevant sense for a teacher, is a level of understanding that allows her to know what it takes to reconstruct the knowledge that is being given to the students. The teacher should know what the relevant concepts are, and thus be able to

This follows from the very idea of ‘learning how to learn’—teachers cannot consistently mold their students into good learners if they do not think correctly about what they are teaching.<sup>69</sup>

Besides mastery of the subject matter, I will discuss two other important qualities teachers should hone, namely, communicative clarity and empathetic understanding<sup>70</sup>.

Discussing what is crucial to the practice of teaching will naturally lead to the question of how to train teachers. I will open with a dialogue about what kind of specialization we may want our teachers to have: specialization in a subject (training teachers to teach, say, mathematics) or a grade (training a teacher specifically to be a first grade teacher). This discussion will be directed at the education of the teachers on the content they will be expected to know. Only after having addressed the content of their training will I begin answering the question of how they will learn (or, in some cases, prove their ability) to teach. In particular, I will engage with a question of theory versus practice. That is, should a teacher take separate classes on methodology and ideology or is it better for teachers to learn in an active classroom<sup>71</sup>. I will argue in favor of the

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give a meta-level description of the logic behind the concept being taught. Coming from the last chapter, the teacher should be able to draw a ‘concept map’ showing how the new concept can be constructed from other concepts. This will require a high level of comfort with the subject matter being taught as well as some knowledge of related material from other disciplines that may tangentially enter the lesson.

<sup>69</sup> Anyone who is interested in current issues in education may see the difficulty in attaining teachers of this stature. Particularly, the hot topic of unionization that is sometimes seen as precluding school districts from rewarding good teachers and reprimanding bad ones, makes this subject one that is deserving of a separate discourse that is out of scope within the current essay.

<sup>70</sup> Empathetic understanding is meant to suggest that teacher should be able to understand the mindset of her students. Another heading that I considered placing this quality under was ‘folk psychology’. Mostly because I will not suggest teachers need a series of courses on how to deal with children, but rather a development of the adaptive ability of adjusting to different classrooms and/or ways of thinking.

<sup>71</sup> For clarity, I want to point out that when I say, “...in an ‘active classroom’,” I mean training within an ongoing class that would be of the type the teacher-in-training would

latter, taking seriously the idea of teaching as a *practice* that one must come into, and, in the spirit of my thesis, must be passed down (and refined) through a series of doings and criticisms.

Once a thorough discussion of these two sides of teaching is complete, I will move on to the issue of assessment. The first question I will need to answer is what exactly are we evaluating in a learning how to learn system. If my stress is not so much on content, but rather the ability to learn, how exactly is that evaluated? I will only partly answer this question here due to the fact I want to open up a critique of the current way we assess. I will suggest that what we have called assessment (multiple choice, true/false, and certain types of word problems) and evaluation (letter grades) is a poor and unfair way to examine what someone knows and is counterproductive to motivating students. A criticism like this will require me to reinterpret the methodology behind assessment. In particular, I want to examine the contrast between one-on-one assessment and group testing. After having brought about this critique I will circle back around to answer my initial question by showing how one could better interpret the progress of a learner through different methods of evaluation.

Finally, I will come face to face with one of the most pressing debates in contemporary education: standardized testing. My reconfiguration of assessment will clearly undermine practices of standardized testing. A common counter argument against alternative assessment is that colleges and employers will have a hard time gauging differences between schools and students without some standardized model. I will reject this as an issue and explain how the

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eventually be in charge of. Thus, this type of training would entail observing and being observed teaching—a stronger version of what we call ‘student-teachers’ today.

relevant differences between students can be shown through portfolios, letters from teachers, and writing samples<sup>72</sup>.

#### 4.1 THE PRACTICE OF TEACHING

Teaching is one of the most fundamental activities of the human race. From passing down cultural and familial traditions to training the next generation of physicists and philosophers, the role of a teacher fits into a large spectrum of our pursuits. Due to this variety, it is difficult to pinpoint what an act of teaching is. Sometimes a person may take on the role of a teacher and not even know it. A man who is skillfully cooking a soufflé may ‘teach’ an observer something about patience, flavor, or multitasking without him ever planning to teach anything. I point out this general property of teaching to exemplify how difficult it is to say precisely what it is to teach and how to do it.<sup>73</sup> However difficult, that issue will be subsumed in my first task—answering the question, “what makes a good teacher?” It is impossible to know what a good teacher is without first recognizing what counts as teaching. This truly is a problem because a common response to what teaching is may be, “aiding in learning” or “providing someone with new knowledge or understanding”. These cannot be complete answers because there are many

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<sup>72</sup> Writing samples should not be taken as a strict suggestion, and may be replaced by some kind of entrance exam for someone wanting to do mathematics.

<sup>73</sup> For a detailed attempt at coming up with a theory of teaching see: Kerr, Donna H. *The Structure of Quality in Teaching*. Philosophy and Education: Eightieth Yearbook of the National Society for the Study of Education. Ed. Soltis, Jonas F. 1981. University of Chicago Press. She takes a in depth look at why it is so difficult to characterize an act of teaching and then uses contemporary philosophy of intentional action to attempt to provide a basic account of what a theory of teaching would look like.

times when one may learn something by merely watching another person be foolish. If anyone were to call the man who drank too much beer and taught his peer the consequences of heavy drinking a ‘teacher’ – it is a metaphor at best. In order for our discussion to be helpful in understanding what a teacher in an educational institution should be like, especially one teaching in a curriculum like the one being suggested, the act of teaching should at least be a planned act. Thus, I am going to stick to instances of teaching that are intentional in my consideration.

This is an important part to my overall thesis because though teachers may ‘accidentally’ produce great learners from time to time by just presenting a bunch of facts, the proposed system is one that hopes to grant most *everyone* with the capacity for good learning. If we want to produce good learners, non-accidentally, then the teacher will need to truly know what she is doing.<sup>74</sup> This brings me to the first (and I will say most important) quality necessary in the practice of teaching: the teacher must be a master of the knowledge that she intends to impart to her pupil. There is a multitude of reasons why a teacher must have a complete knowledge of what is being taught. To begin with, there is the obvious fact that for an act of teaching to be intentional the person teaching must previously know what it is they trying to teach their pupil. Even an older sister who uses an aphorism like, “the early bird gets the worm” toward a younger brother must understand what virtue she is teaching him before passing the phrase along as a lesson. This example should make it clear that the person who is teaching does not need to be a

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<sup>74</sup> My saying this may be due to me taking on a constructivist stance on teaching and learning in general. Since the constructivist will say, “instruction must be designed so as to provide experiences that effectively interact with these characteristics of students so that they may *construct* their own understanding,” [Howe, Kenneth R and Berv, Jason. *Constructing Constructivism, Epistemological and Pedagogical*. Constructivism in Education: Opinions and Second Opinions on Controversial Issues. Ed. D.C. Phillips. 2000. University of Chicago Press. Pg. 31]. I am lead to say that it is important that the teacher already deeply understands how construction of the knowledge at hand works.

genius of their field, but rather have a grasp that allows them to determine a sufficient mode of presentation to reconstruct the knowledge in another. Most likely, the older sister would not be qualified to be a teacher, but the point is that she understood the virtue well enough to present the apothegm at the right moment. This basic fact only touches the surface of the importance of a teacher having a mastery of the subject matter prior to teaching it.

Moreover, a teacher must be able to come up with a lesson plan. Whether we are talking about teaching someone the violin or how to program computers, "...selection of appropriate particular learnings [sic.] to encourage calls for an analytic understanding of the general subject."<sup>75</sup> Creating a strategy to teach material to students means that the teacher needs to know the structure of the knowledge she is dealing with. An important feature of the system I am supporting is that the content of the curriculum connects up. This means lesson plans (or teaching strategies) cannot merely be finding a set of relevant assignments out of a teacher's manual, but must be an overview of how the new material can be constructed from previously taught concepts. Thus, to setup a strategy will require a broad understanding of the topic. As pointed out by Donna Kerr in her examination of the theory of teaching, regardless of how good a teacher is at presenting material or getting children to learn things, "...the quality of one's teaching depends in important part upon one's understanding the subject well enough both to choose appropriate learning's and to design plans that do not violate the nature of the subject matter."<sup>76</sup> This highlights a worry for a teacher who may not fully understand the material: she may actually teach the material in a way that is harmful to the future use of the concept. Or,

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<sup>75</sup> Kerr, Donna H. *The Structure of Quality in Teaching*. Philosophy and Education: Eightieth Yearbook of the National Society for the Study of Education. Ed. Soltis, Jonas F. 1981. University of Chicago Press. Pg. 81

<sup>76</sup> Ibid. pg. 81

alternatively, a teacher who is not completely comfortable with the concept being taught may sprout confusion in students by coming up with poor examples when trying to teach a topic from multiple perspectives.

Let's imagine a teacher who is going to present Snell's Law. From the standpoint of two different teachers—both educated in physics—lesson plans may be very different based on how well they understood this concept in relation to others in physics and math, and whether or not they have revisited the idea comprehensively prior to teaching it. One teacher may simply decide that they will present the formula, define the pertinent terminology, and then choose some practice problems out of a book to assign for homework. Another teacher who realizes that to truly understand this law and move on to things such as polarized light, total internal reflection, and other parts of optics, a broader view will be necessary. This may lead her to start with a review of geometric functions (sine, cosine, tangent), then a reminder of how to break up vectors into right triangles, and finally an introduction to *index of refraction* before ever presenting the formula to the students. Though the first strategy may be fine for certain students, the latter strategy ensures that each major concept that is prerequisite to Snell's law is brought into context in order for a full construction of the new knowledge.<sup>77</sup> This is going to be especially important with students jumping from teacher to teacher each year and/or between classes, as is usual in high schools. It is easy to make false assumptions about what the students have learned and,

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<sup>77</sup> For another perspective on this issue of devising a strategy, look to Stevenson, Harold W. and Stigler, James W. *The Learning Gap*. Summit Books: 1992. New York, NY. The book provides an in-depth comparison of Asian and American schools, and their section on coherence (pp. 177-83) looks at lesson plans which hold together like a cohesive story versus ones that are more of a collection of desultorily chosen facts.

more importantly, having made the right connections from other classes.<sup>78</sup> A point Kerr mentions in her theory provides a clear analogue to precisely this issue:

“...misunderstanding the span of applicability of a given view of learning can result in inappropriate plans for encouraging particular learning’s as, for example, when a parent tries to reason with a young child to change the child’s behavior before the necessary structures for comprehending the reasoning have been acquired by the child.”<sup>79</sup>

Without a teacher who can make a plan that brings to light all the relevant information required for proper construction of the new knowledge – the lesson may be incomprehensible to students of certain backgrounds. Even in the case of having prerequisite classes that should take care of this, it seems the best strategy for a teacher to choose will take into consideration the underlying concepts and steps that lead to full understanding.<sup>80</sup>

Another aspect of good teaching that is derived from the teacher being a master of the knowledge she is presenting is that, in the delivery of the material, improvised guidance can be used to facilitate the student’s understanding. This is a similar skill that Rousseau dreams of when he is thinking of Émile’s tutor—someone who can lead the student in the right direction without explicitly handing over answers. Now obviously, the classroom situation I envisage is far different from Rousseau’s natural education; however, upon presenting the material the teacher should be able to “bait traps” to prod students into grasping the lesson. A clear understanding, on the side of the teacher, should allow her to pinpoint common misconceptions

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<sup>78</sup> Of course, some assumption must be made regarding what students how; however, I will discuss a way to make these assumptions less dangerous in the next section when talking about how teachers should maintain good communication regarding the lesson plans they will be using.

<sup>79</sup> Ibid. pg. 83

<sup>80</sup> This is also where the preliminary tests can be useful, as it will aid in identifying a particularly bright class that needs less review from a class where the majority of students are missing some of the basic building blocks required for the lessons ahead.



to which students' fall victim, or realize the missing step the student has left out in her construction.<sup>81</sup> This guidance may take the form of a question whose answer lies close to the issue the student is having, an alternative explanation whose content is more akin to the student's abilities, or coming up with a clear analogy. Regardless of the form, these on-the-spot learning aids require the teacher to deeply understand the subject matter and its related concepts.

The final aspect of teaching I would like to touch on while still officially under the subheading of 'teachers as masters of the information they are teaching' is how student mistakes are treated. In no way do I mean to discuss the way a pupil is assessed, reprimanded, or emotionally supported after making a mistake. Instead, I am interested in what the teacher does to correct the student—how does the teacher disabuse the student of the issue she had? This specific ability seems to follow from a clear understanding of the material at hand. Outside of common “oops”-type errors (e.g. incorrect mental math, transcribing the question incorrectly, forgetting a negative sign, etc.), a mistakes made by students are commonly a derivative of a misunderstanding of the new material, an erroneous connection with related material, or improperly learned concepts that are foundational to the new material. In the mind of a teacher who truly understands what is being taught, many of these considerations should be in view when anticipating issues that might arise in class. A mistake should then be treated according to how the incorrect act reflects a misconception of the knowledge attempting to be imparted to the student. Rather than a mere red-pen correction, teachers should be able to locate where such

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<sup>81</sup> A common criticism to this point may come from someone noting that often the brightest thinkers are the worst teachers. While this is a valid complaint, it is the reason I will extend these qualities beyond mastery of the knowledge being taught. I do, however, believe that mastery is what allows a teacher to understand the common impasses a learner may face in their a progression on a topic regardless of whether that makes the teacher capable of communicating these challenges.

a mistake stems from, and thus explain away the issue, hopefully, while the misconception is still nascent.

An example could be a teacher who just finished a lesson on kinematics and is having the students try some problems. The teacher notices that one of her students has consistently misused the sine and cosine when breaking up the velocity vector. From the standpoint of a teacher who is only understanding the material on the surface, the mistake may be corrected by merely telling the student, “This is wrong because you have switched the sine and cosine—the cosine aids in finding the x-direction of the velocity, while the sine is correlated with the y-direction.” A suggestion like this may be fine for the moment, but perhaps has not helped the student beyond this one specific application. Future problems where the x and y directions do not fit to the sine and cosine in this way (e.g. a Newtonian force problem where a block is sliding on a plane with a given coefficient of friction) will potentially be an issue for the student. Whereas a teacher who sees more than just a calculation error, but a misunderstanding in the application of geometric functions may take the student aside and on the chalkboard provide a review of right triangles and geometric functions (or if it is a wide-spread problem among the class – it may be worth conducting a class review). Most likely this review would take no more than ten minutes (unless the student has misunderstood many things along the path to this concept) and should not only correct the solution to this specific problem, but also prevent perpetuation of this error in the future. Again, if we expect teachers to have the ability to see to the root of mistakes made by their students, they will need to have an analytic understanding of the subject matter. In the above case, if the physics teacher did not have a good grasp of trigonometry and its application to physics, the mistake may not have been appropriately handled.

Regardless of how well the teacher grasps the material that is to be taught, the ability to produce a lecture or explanation will be reliant on the teacher's communicative ability. Putting thoughts to words is a common issue in any mode of discourse, but, in the case of teaching, the utmost care should be put into how one expresses the concepts. Poor communication may lead students to misinterpret the concepts. How a teacher chooses to convey a concept plays an integral in determining whether a lesson aids in development of knowledge or undermines the aim of the lecture. I am encroaching upon a distinction that will be developed further in the next section on training; however, I would like to mention now that training for this aspect of good teaching favors practice over theory. Conjuring up the words that will ameliorate a clear understanding in the students' minds is a skill that may take years of teaching the same class to find an appropriate representation of the material. Using experienced teachers to inaugurate newer ones to the practice of teaching has the advantage of putting to use practical criticisms that are backed by in-class trial and error. Improving a lesson plan that has been proven year after year to confuse students could be as simple as a one-hour meeting between teachers to discuss how they plan to give their upcoming lectures. A further upshot of this way of training teachers on classroom communication is that tenured teachers get the opportunity to hear fresh perspectives on material they have been teaching for a long time, and, perhaps, have fallen into a languid mode of instruction.

Despite my emphasis on the teacher's knowledge of the subject, it appears that this point of clarity is the one that is widely ignored in American schools. According to one of the many surveys conducted by Harold Stevenson and James Stigler for their book *The Learning Gap* less than ten percent of American teachers saw clarity to be the most important attribute of good

teaching while almost fifty percent of Asian teachers believed it to be the most important.<sup>82</sup> Without diving into comparisons of Asian and American schools, this is a showing statistic that the ability to communicate material is not being taken seriously, while being an important part of teaching.

Finally I will elaborate on the third ability I see as pertinent to good teaching—empathetic understanding<sup>83</sup>. I am using the term to try and pinpoint the ability of certain individuals to see into the thought and social patterns of others and quickly adapt. Something much like the guy or girl in your high school who just understood and fit in with the various cliques without trying. Now, I realize what I have just described sounds more like a natural ‘knack’ for popularity, but I see it as a trait that can be developed over time as an act of empathy (i.e. actively trying to understand *why* a person is thinking or feeling they way she does). While this ‘knack’ may be similar, instead it is the capacity some teachers have to adapt to the wants and needs that will inevitably vary between different students and classes. Knowing how to morph one’s expression of the material in a way that catches the attention of a particular class, seeing common mistakes done by a student and, in turn, getting a grasp of her learning style, or

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<sup>82</sup> Stevenson, Harold W. and Stigler, James W. *The Learning Gap*. Pg. 167. The survey asked American teachers in Chicago and Asian instructors in Beijing to choose the most important attribute of teaching out of clarity, sensitivity, enthusiasm, standards, and patience. The American teachers most commonly chose sensitivity (about 47%) while the Asians chose clarity (about 49%).

<sup>83</sup> As I mentioned in the footnote above, I have struggled in choosing a term to pin down what I mean in describing this teaching quality. Because I see it as semantically elusive I would like to also provide the definition of ‘folk psychology’ that I found compelling coming from D.C. Geary’s article, *Folk Knowledge and Academic Learning*. He defines it as, “...the affective, cognitive, psychological, and behavioral systems that are common to all people and enable them to negotiate social interactions and relationships.” [Geary, D.C. *Origins of the Social Mind*. “Folk Knowledge and Academic Learning.” B. J. Ellis & D. F. Bjorklund (Eds.). Guilford Publications: 2005. New York, NY. Pg. 497.]For a different term that has been used to describe a similar ability also see Howard Gardner’s use of *Interpersonal Intelligence* (pg. 16) in his book *Multiple Intelligences* [see full citation below].

realizing how to partner up students in a class for a project in a way that will be most beneficial are all examples of the important teaching quality that I am calling empathetic understanding. I already may be begging for a critic that asks, “how in the world could you teach this ability?” and I will come to this in my next section. For now, grant me some space to be clear on what exactly it is I am talking about.

A teacher who has the capacity to understand her students could alternatively be seen as someone who has a broad social understanding. This may come from having educational breadth or a wide range of life experience; regardless, the ability to relate and ‘swim in the world’ of the students is an ability I see as maximizing the effectiveness of the above two teaching qualities that have been discussed. Many aspects of the ‘learning how to learn’ system require teachers that can find the right tactics to reach their students: rounded concepts using multiple methods, use of good examples, picking creative projects that motivate students, etc. I do not, however, believe that it (necessarily) is the job of the teacher to be a councilor to their students.<sup>84</sup> Instead I am concerned with how the teacher, in virtue of watching her students develop, learns about the students. There is an old saying in education, “one teaches, two learn,” implying that the teacher is also enlightened by the process. Empathetic understanding is an upshot of this recursive learning that comes from seeing how the student pieces together the information one is teaching. Then the teacher can use what is known about the student to inform the technique which she is employing in the classroom. A one-on-one teaching scenario, much like a parent-child relation, brings about this student-teacher relation much easier due to the

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<sup>84</sup> I also do not see anything wrong with teachers knowing their students on a personal level; rather, I see this as a positive addition to the student-teacher dynamic. However, particularly in elementary school, I would like to separate myself from a ‘baby-sitting model’ of teaching.

sheer amount of time spent in front of one another. An entire classroom of students is much more difficult to understand on this level; however, this is why I see empathetic understanding as a special ability a good teacher should sharpen before having her own classroom.<sup>85</sup> Without stereotyping students, being able to see how they think and are motivated is a skill that makes the most of the first two aspects of teaching discussed. Once the teacher knows her students, lesson plans can be fine-tuned and open communication can be achieved.

Assuming everything I have said above about the practice of teaching, the discussion now takes a turn into how we train teachers to fine-tune these qualities.

## 4.2 TRAINING TEACHERS

When deciding how to train teachers I see two primary places where disagreements may occur: when choosing the sort of specialization the teacher should receive and finding a balance between theory and practice that leads to the best results. I will first engage with the idea of specialization because it would, chronologically, be the first issue confronted by a person wanting to be a teacher.

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<sup>85</sup> Outside of finding this true from my own teaching experience, I believe the importance of this quality is well expressed in Jonathan Kozol's work *On Being a Teacher*. [Kozol, Jonathan. *On Being a Teacher*. The Continuum Publishing Corporation: 1981. New York, NY.] Being one of the biggest critics of the American education system during the past 30 years, Kozol goes through the struggles of being a teacher who really wants to *teach* something to his students. His chapters on disobedience and extreme ideas from students exemplify how knowing your student can turn any classroom situation into one primed for learning. Though I did not quote him due to the specifics of his discussion on classroom issues – reading his experience has hugely informed this notion and should be read to get a first-hand perspective of why this teaching quality seems so important to me.

This is a question of how we provide soon-to-be teachers with the subject knowledge that we will later expect them to teach. Should the teacher go through a liberal arts education that has more breadth than depth to meet the needs of younger students (grades K-5), which, in most schools, will be with the same teacher for all subjects? Is it better to have the educator choose a single subject of concentration, and allow the liberal arts portion of an undergraduate education inform the peripheral knowledge that her chosen subject requires for mastery? Or, is it better to make a standardized curriculum that varies pending on what grade the individual wants to teach? All of these questions come with their own baggage as individual schools vary on when students start switching classes for different subjects, what curricular content they favor, and what subjects are offered at the upper levels (junior high and high school). Another consideration is whether undergraduate education should be where teachers begin their training or should that be passed on during graduate programs? With all of these looming issues in the open, I will focus in on my stance.

To begin with, the broad-minded attitude that is inherent in the educational goals and curriculum for which I have argued, will mean that a liberal-arts-style education is going to be beneficial for bolstering its needs. Particularly in pupils' early years of education where subject distinctions are less explicit, the teachers will need the breadth to draw connections across the disciplines, but much less depth as the material is elementary. The two types of training that would provide for such abilities are a non-focused, but carefully rounded, liberal arts education, or grade specialization. This would depend on how institutions applying such a theory decide to interpret the chapter on curriculum. There may be a school that believes there is a very specific set of content that fills in the curricular theory supplied. Schools in the tradition of Gardner and Hirsch that take on a strong belief about "core knowledge" may want a specific progression and,

thus, grade specialization may be a more appropriate approach. Then the specific content will assuredly be taught in universities by having particular tracks depending on what grade one chooses to ‘major in’. In the spirit of this thesis, I see the content being second to the structure and having exercises that are emulating proper learning. Thus, it seems preferably elementary school teachers should take on a pure liberal arts degree, where the only soft requirements are that classes in all of the major subjects should be pursued in some capacity.<sup>86</sup> As I will soon discuss, the teachers will then – upon being hired – be able to collaboratively decide on how to structure the content within their given school – based upon the individual skills of the teachers.<sup>87</sup>

Teachers who are more interested in secondary education<sup>88</sup> will be better trained by taking on a focus as undergraduates. For the most part this is precisely how training of secondary school teachers happens today. There is one somewhat non-orthodox feature of this system of training that I would like to make salient: beyond choosing a concentration—classes in related fields should be required. This could be similar to the ‘general education requirement’ mandate in place at many liberal arts institutes; however, this often ends up being a desultory choosing of classes whereas for educators it may be important to keep a focus on classes that

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<sup>86</sup> It is important that I mention that this is not a practice that is out of play in today’s track of becoming a teacher. Many institutions look highly upon this sort of education when searching for applicants in teacher accreditation and masters programs.

<sup>87</sup> This is an important point to be mentioning because I can feel the worry of a critic who may have been concerned about how I would deal with students being turned over to different teachers throughout elementary school. If each teacher structures the class based on their self-guided college curriculum, how will the transitions between teachers maintain the thorough connection I am asking for in Chapter 2? Hopefully, seeing that my desire is for teachers to collaborate about this exact issue makes it simpler to envision how this year-to-year process could be handled smoothly.

<sup>88</sup> The distinction between primary and secondary education is not a uniform one so I will point out that I see the bifurcation coming at the point when students begin to have different teachers for individual classes.



bolster knowledge in the area in which she will be teaching. A civics or social studies teacher should have a good grip of the history of democratic society just as a physics teacher needs to know the mathematical concepts related to what she is teaching. Thus, a teacher who studied chemistry should have to have some education on the other major sciences and mathematics to be prepared to create assignments, answer questions, and plan lessons that step into these domains.

To sum up what has been said about specialization: elementary school teachers should have a broad foundation supported by a liberal arts education while secondary school teachers will need to receive a concentrated education with appropriate backing in relevant academic areas. This part of training teachers, in my eyes, could be done in a number of ways. The important thing is that the teacher steps into the classroom with a strong grasp of what she will be teaching. Perhaps I am quixotic to believe that students will become masters of the subject matter they will later teach<sup>89</sup>; however, this is what will lead me to argue for a very particular method of training teachers how to teach. As I will soon describe, the training of teachers should

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<sup>89</sup> I bring this up due to the fact I see this as a common theme when theorists are talking about teachers. In principle I agree with Jacques Barzun when answering, "...what sort of training should such a person [a teacher] get?" He says, "...brains enough to feel bewildered and revolted by the educationist language—and courage enough to admit it. Next, a strong interest in some branch of learning, meaning any one of the genuine school subjects...In addition, a teacher should have some interests beyond his or her specialty. In bearing, in manner of thinking and talking, a teacher should quite naturally appear to be a person with a mental life, a person who reads books and whose converse with colleagues is not purely *business*..." [Barzun, Jacques. *Begin Here: The Forgotten Conditions of Teaching and Learning*. University of Chicago Press: 1991. Chicago, Il. Pg. 98] If this were a common description of a person stepping out of university, I may feel no need to write this thesis. Since it is not, the training of teachers must aim at molding individuals who would be prime suspects for being good teachers, regardless of the current state of affairs. Setting the bar low would only perpetuate the problem into an even more critical condition. Further, this is a way to combat the degrading perception society has taken toward teachers – making teaching a more rigorous pursuit may actually incentivize individuals of higher intellectual standing to pursue teaching as a vocation.

follow in the tradition of the ‘learning how to learn’ system: training good teaching methods to new teachers through acts of teaching that are watched over by experienced teachers, criticized, and, in turn, further refined. I bring this up now to alleviate any tension that may be building up regarding the expectation for teachers to achieve broad mastery of their subjects. Through tactful training, the teachers should achieve an analytic understanding of their subject(s). This brings me to the issue I have been alluding to: training students to become teachers.

The method of training teachers that I will be supporting has blossomed out of a comparison of Asian and American schooling. The American system usually (though it varies state to state)<sup>90</sup> requires one to attain a teaching certificate. This involves a series of classes on educational theory and techniques and a required number of hours student teaching. Whereas, in certain Asian systems, students are eligible to become teachers directly after high school, after having received intensive training within a school and having been critiqued by ‘elder’ or master teachers. To officially open my layout of how to train teachers I would like to take a quote from Stevenson and Stigler’s *The Learning Gap*:

...we are willing to subject our children to teachers, who, after completing their coursework, have had only a brief period of student teaching, often under the supervision of a practicing teacher who is so busy that she has neither the time nor the energy to give careful, critical attention to training a beginner.<sup>91</sup>

This emphasizes what I find so disconcerting about teachers’ training in America: they are given a classroom while still being beginners in the practice of teaching.

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<sup>90</sup> To get an idea on how various states certify/license teachers look to the University of Kentucky’s education department who have compiled the variety of requirements: <http://education.uky.edu/AcadServ/content/50-states-certification-requirements>

<sup>91</sup> Stevenson, Harold W. and Stigler, James W. *The Learning Gap*. Pg. 158.

My solution to this is influenced by both the Sellarsian theory of learning and the Asian approach to training teachers. Harking back on the issue of theory versus practice, rather than theory being something that is a required study in order to attain a teaching certificate I see it useful in two lights: as something that is considered within an individual school by its teachers to reflect on the overarching themes of that institution or as an academic pursuit whose aim is to grab the attention of currently practicing teachers (much like philosophy's relation to the other disciplines). The actual training of teachers should be seen as an inauguration into the practice of teaching done by experienced individuals who have mastered the art.<sup>92</sup> Thus, rather than merely observing, and occasionally interacting as a student teacher, it seems more fitting to hire teachers out of undergraduate based on ability (either strong subject knowledge or having shown an apt capability for explaining ideas) and allow them to slowly become teachers within the walls of a school. To begin with, (perhaps in the first six months to year) a newly hired teacher could study under an experienced teacher examining how she has devised plans for learning and methods of presenting material. Not only would this immersion give new teachers first-hand experience in their profession, but also allow tenured teachers more time to set up large-scale projects and spend time one-on-one with students as there would always be training teachers acting as class helpers. Then, as the teachers in training become more acquainted with classroom dealings, they could begin to structure their own lesson plans and perform them in front of experienced teachers allowing for criticism. Lesson plans designed by new teachers could be

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<sup>92</sup> A ubiquitous complaint among new teachers is that, "...most of what they know had to be learned by themselves, alone, on the job" [Ibid. pg. 158]. Walk into the education section of your local bookstore—an entire shelf normally contains books on 'what you did not learn in college or teachers' training'. As an example cf. Rutherford, Paula. *Why Didn't I Learn This in College? Teaching & Learning in the 21<sup>st</sup> Century*. Just ASK Publications: 2009. Alexandria, Va.

discussed in group meetings while communicative ability and empathetic understanding are developed by being constantly critiqued on actual performance. This idea can be extended beyond the realm of training new teachers and should open up dialogue that allows all teachers to constantly be reevaluating their methods in contrast with other teachers. This latter suggestion is similar to the Japanese system of teaching:

...Japanese teachers, beginners as well as seasoned teachers, are required to perfect their teaching skills through interaction with other teachers. For instance, meetings are organized by the vice-principal and head teachers at their school. These experienced professionals assume responsibility for advising and guiding their young colleagues. The head teachers also organize meetings to discuss teaching techniques and at constructing plans for specific lessons. A whole meeting might be devoted to the most effective ways to phrase questions about a topic or the most absorbing ways of capturing children's interest in a lesson.<sup>93</sup>

So it is not a new idea to push for teachers, as a whole, to criticize and refine their techniques—and I am sure that many interested teachers do this on their own; regardless, I see this as a method that is necessary if we want all teachers to be able to promote proper learning.

The above ideology behind training teachers is in stride with the theory of learning I presented in the last chapter. My hope is that the crucial attributes of a teacher can be slowly transmitted into one's teaching ability through constant criticism. It is in this way that new teachers can hone these abilities by observing, being observed, and finally being criticized. This will allow the clearest explanations and examples, as well as the strongest lesson plans, to disseminate through the entire school. Also, this communication between teachers should aid in tracking the progress of students as they move through the 'learning how to learn' system. With less focus on content, the construction of concepts can be followed as students are handed over from teacher to teacher. This is what may be stated as the "effects of a common curriculum". If

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<sup>93</sup> Ibid. pg. 160.

the curriculum is viewed as a conceptual structure and pedagogy as the way to construct the knowledge and impart the appropriate learning skills into the minds of students, the teachers can act as a cohesive whole in realizing this process—deciding on content and activities as they see fit.

When we truly think of teaching as a *practice*<sup>94</sup>, it becomes clear why any educated individual can become a teacher without a background in educational theory. Asking teachers to complete a series of courses that are supposed to provide them with the knowledge necessary to be a teacher is treating the discipline as if it were a science. Whereas, in teaching it seems there is no guaranteed method for success, but, rather, it is an art that one must carefully master.

I would like to now turn the discussion on to the precipitant of the action between students and teachers: evaluation.

### 4.3 EVALUATION

A fundamental question in the area of evaluation is, “what is it that we are assessing?” The ostensive answer to this is that we want to make sure that they are learning the material. Though this is unclear because it is difficult to diagnose what exemplifies proper versus improper understanding. Is it enough to just have memorized the basic facts from a lesson? Should the student be able to reformulate the topics in her own words? Is it practical application that we are concerned with, or conceptual understanding? Does our wording of problems appeal to certain learners and mislead others? All of these questions express concerns that have been brought up

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<sup>94</sup> I highlight this in opposition to treating teaching as a *knowledge* that can be given through study of theory.

in contexts regarding assessment, but before addressing these problems, I must first discuss how assessment fits into a ‘learning how to learn system’. This is a two step problem: figuring out how to get content out of students that is indicative of their progress and, from this, how can we come up with a methodology of evaluation. The second half of this will require me to go against mainstream methods of evaluation. Thus before piecing together a positive account of how evaluation takes place, I will argue against certain modes of current assessment. Finally, I will end with suggestions for better methods of evaluation.

To begin exploring the terrain of evaluation, it will be helpful to talk about what kinds of assessments provide teachers with valuable content. This will later make sense of my criticisms in light of what assessments I endorse, and then allow me to be clear in formulating a methodology for evaluation. Let us consider a class after a section on World War II has been taught – is it more important to ask a student to recall the dates of the battles and names of the generals, or to express her understanding of extreme socialism, fascism, and uses of propaganda? It is hard to say that a student who does not remember many of the specifics, but can have a provocative discussion on the major themes of WWII really ‘learned less’—though, pending on the test we provide, we may say otherwise. A contemporary education theorist, Alfie Kohn, has confronted a similar question in his essay, *What Does it Mean to be Well Educated?* Toward the end of his discussion he describes the type of schooling he believes to be valuable, and I think this will make for a nice transition between the question regarding valuable content I have posed and the answer I will provide.

As I see it, the best sort of schooling is organized around problems, projects, and questions—as opposed to facts, skills, and disciplines. Knowledge is acquired, of course,

but in a context and for a purpose. The emphasis is not only on depth rather than breadth, but also on discovering ideas rather than on covering a prescribed curriculum.<sup>95</sup>

He is wishing for schooling that does not take one piece of information out of a curriculum as privileged over any other; rather, he believes that achieving large-scale goals, coming up with interesting projects, and asking good questions is just as valuable (if not more valuable) as any specific piece of information that is learned. This is precisely the kind of attitude I have when considering, “how do we tell who has ‘learned how to learn’?”. It does not seem that this can be determined by testing for any set of specific facts or formulas. My thought is that we are looking for the students to be making the right connections between class content, asking progressive, pressing questions in regard to new material, and showing impressive creativity and understanding in their projects and papers. All of this will, of course, be part of integrating new information into their knowledge base and being able to solve certain problems; however, I do not take these as exhaustive measurements of a student’s progress.

After a comprehensive survey of testing strategies, the National Research Council published a book entitled, *Knowing What Students Know*. Their mission was to explore what methods of testing were accurate in assessing student knowledge. Though it is outside of my scope to begin critiquing individual tests, I would like to use their concluding view of the future of assessment in order to corroborate the methods I will support:

Teachers will assess students’ understanding frequently in the classroom to provide them with feedback and determine next steps for instruction...Teachers will use this knowledge to design assessments that provide students with feedback about particular qualities of their work and what they can do to improve. Students will provide evidence of their understanding and thinking in a variety of ways—by responding to teachers’ questions, writing or producing projects, working with computerized tutoring systems, or attempting to explain concepts to other students...Students will be engaged in activities

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<sup>95</sup> Kohn, Alfie. *What Does it Mean to Be Well Educated?* “What Does it Mean to Be Well Educated?” Beacon Press: 2004. Boston, Massachusetts. Pg. 8.

such as peer and self-assessment to help them internalize the criteria for high-quality work and develop metacognitive skills.<sup>96</sup>

This description envisions assessment that arises organically out of the progression of the class. Their depicted way for students to show their understanding is analogous to the above description of assessment I have supported. Also, they want students to both slowly be able to track their own progress through well thought out feedback and self-assessment as well as conduct peer instruction and assessment. This falls directly in line with the critical inculcation that is inherent in the ‘learning how to learn’ curriculum. Not only are we passing on the criticizing task to the learners, but we are also giving them a chance to recursively solidify what they are learning and take some burden off of the teacher by becoming active in peer instruction. It is within these evaluative measures that I see teachers receiving the best content for understanding how a student is progressing.

Prior to transitioning into how we take the aforementioned ‘valuable content’ to form a method of assessment, I would first like to flush out why I dismiss many of our current evaluative practices, specifically the use of grades and multiple-choice exams<sup>97</sup>. Before criticizing the role grading has in our educational systems, I will start with the ways in which grading has been an integral part of our educational systems. When used correctly, grades are meant to motivate students into striving for success in school. Rewarding good students may give them reasons to push harder rather than merely ‘get by’. Further, it is a way to keep

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<sup>96</sup> National Research Council. 2001. *Knowing What Students Know: The Science and Design of Educational Assessment*. Committee on the Foundations of Assessment. Pelligrino, J., Chudowsky, N., and Glaser, R., editors. Board on Testing and Assessment, Center for Education. Division of Behavior and Social Sciences and Education. National Academy Press: Washington ,DC.

<sup>97</sup> This will include many of the variations such as matching, fill in the blanks, choosing a summary statement, etc.



teachers accountable: without grades and tests as regulated measures of student progress it is difficult to generate external measures to be sure teachers are actually challenging their students. Also, for the sake of teachers, grades and knowledge-specific testing is a way to make sure students actually learn the material that has been focused on in class. While there are reasonable considerations for the use of grades, there are many aspects of the grading system that deserve scrutiny – particularly when considering evaluation within a system whose aim is learning skills over content.

To begin with, grades appear to me as one of the primary reasons many students get disenchanted with learning at a young age. A letter representing a faux-intelligence rating<sup>98</sup> that, from the student’s perspective, tells them they are good or bad at something may end up being counterproductive to kindling an interest in learning. Further, this potentially places motivation on doing what it takes to achieve the grade rather than becoming a good learner. Using this model of punishment-reward to motivate people has proven time and time again to be counterproductive. Even in the workplace studies show that it is not monetary rewards making workers do their best.<sup>99</sup> As far as incentive-based research in education, I will borrow again from Alfie Kohn who pointed me in the direction of experiments in this field:

...students told they would be graded on how well they learned a social studies lesson had more trouble understanding the main point of the text than did students who were

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<sup>98</sup> A critic may want to say here that it is a fallacy to see grades as an intelligence rating, and this may be so for older, say, high school and college students. It does not seem correct, however, to expect a child in primary school to see it this way—especially if they may get punished at home or treated differently in school for bad performance. This kind of judgment may be damaging to the future interest students have in their school work because they feel as though they were being told they ‘were not good enough’ from an early stage.

<sup>99</sup> See research done by Douglas McGregor, Frederick Herzberg, Abraham Maslow, or David McClelland. All of their research undermines the idea that offering prizes and rewards to employees as motivation for them to do their best.

told that no grades would be involved. Even on a measure of rote recall, the grades group remembered fewer facts a week later (Grolnick and Ryan 1987). And students who tended to think about current events in terms of what they'd need to know for a grade were less knowledgeable than their peers, even after taking other variables into account (Anderman and Johnston 1998).<sup>100101</sup>

Not only does it seem that grades reduce the quality of students' thinking, but it logically also reduces their desire for difficult assignments. Why would someone choose the hardest assignment, or try to engage with material they are less familiar with, when they are going to be graded on the same scale as their peers who have the opportunity to choose the easiest task available? Grading students actually gives them a *good* reason to do what is simple and unchallenging: they are rewarded for it.

Also, this begs for a similar response that I gave above regarding what is valuable for a student to be learning. Should we tell a student she is not doing well just because she learned things that were not specific to the test that was given out?<sup>102</sup> I can easily imagine a chemistry test that a student gets a C on because she did not just do homework problem after homework problem to get fast at calculations, but meanwhile she was interested in the relation of chemistry to physics and learned a lot from the class about how physics can explain phenomena in chemistry. I realize that grades are used as a way to make sure that students do not just blow off

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<sup>100</sup> Kohn, Alfie. *What Does it Mean to Be Well Educated?* "From Degrading to De-grading". Beacon Press: 2004. Boston, Massachusetts. Pg. 77.

<sup>101</sup> As a possible interpretation of what could be causing grades to interfere with learning is that the added pressure of knowing one will be judged may skew the learner's attention to the material. Rather than thinking through the material, they may be worried that they have missed what will be on the test. This should not be seen as *the* reason for this data, but just as a way to explain so as not to leave the above quote empty.

<sup>102</sup> Being fair to teachers, it is important that the students respect what material you have deemed as important for them to know. The point here is that, at the very least, we cannot allow focused testing to be the only measurement of what they have learned, or else we may miscalculate students who have gained a better understanding of the material than the test has shown.

assignments and pay no attention in class, but the point is to motivate them to learn not to get a pat on the back. Giving learners the freedom to not worry about grades should not be seen as letting them become slackers, but rather as granting them some ability to study what they find interesting. The students who are passive and lazy will show this in their projects, essays, and class participation. In the words of Kohn, “In short, what grades offer is spurious precisions—a subjective rating masquerading as an objective evaluation.”<sup>103</sup>

I decided to take on the idea of grading first because I believe that much of what makes grading unfair are the types of test we employ to determine them; however, I wanted to show that regardless of the testing, grades alone can be harmful. The next culprit to our ability to properly evaluate students is multiple-choice testing (i.e. tests that come prepackaged with answers that have been designed by test-makers). These tests seem to fail in many aspects for which they hope to be testing: they test memory more than understanding, the wording chosen often misleads students who are thinking deeply about the question<sup>104</sup>, the sole purpose of many questions is to trick students, and it promotes students to become good guessers rather than careful thinkers. Many of the subjects we use these tests in (e.g. reading and mathematics) have no cold storage knowledge they can even be testing for—we are removing the solving end out of problem solving. As Barzun pointed out: “Nobody ever learned to write better by filling in blanks with proffered verbs and adjectives. To write is to fill a totally blank sheet with words of your own.”<sup>105</sup>

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<sup>103</sup> Ibid. pg. 78.

<sup>104</sup> It is odd to me that a common answer teachers give to students asking questions during a test is, “you’re thinking too hard about it.”

<sup>105</sup> Barzun, Jacques. *Begin Here: The Forgotten Conditions of Teaching and Learning*. University of Chicago Press: 1991. Chicago, IL. Pg. 34.

In relation to the educational system I am advocating, constantly testing fragmented bits of information rather than fully connected up thoughts blights the entire aim. I see no harm in using some of these types of tests as classroom tools to see if the students are remembering the information that was taught to them the day before, but to base the progress of a student's thought on her ability to identify word-for-word descriptions of what was told to her is a slap in the face to the idea of training students to think for themselves. The only positive aspect of using these tests is that they are quick and easy to grade. If this is the reason some accept for consistently utilizing these tests then perhaps those teachers should be given bad grades for laziness. I think it cannot be said much better than in Barzun's conclusion to his section on de-testing schools:

Instead of forcing these last [prentice minds] (some still in kindergarten) to concentrate their lives on endless form-filling exercises till it seems natural to equate knowledge with "Take a chance and choose," the schools would be well advised to stop and heed Emerson's advice: "Tell us what you know."<sup>106</sup>

I must now turn my attention back to what types of assessment are appropriate to measure the progress of students. I see there as being two brands of assessment in the broad methodology of evaluation: one-on-one and group assessments. In order to examine how a student understands the material and whether or not she is making the right connections between different lessons, oral exams appear to be the best.<sup>107</sup> This is something that became obvious to me after being a student of the tutorial system at Oxford University. I felt that the teachers truly got a sense of how well I understood the material because they were able to question me and hear

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<sup>106</sup> Ibid. pg. 37.

<sup>107</sup> I will admit here that oral exams favor skills of certain students who are better at articulating their views verbally. This is why I see it as important to also assign projects and essays. The hope would be that teachers would come to know their students (especially in primary and early secondary education) and realize who may be showing their knowledge better in essays as opposed to oral exams.

how I dealt with criticism on a one-to-one basis. Often this type of assessment is ignored because it is difficult for a teacher to be able to devote an entire day to testing students one at a time; however, if the method of training teachers described above were employed this would become a fairly easy task as new teachers would be available to take over on these days.<sup>108</sup> Sitting and questioning students not only aids in developing their ability to articulate and engage in discourse, but also allows the student to show the variety of knowledge that she has come across from the lessons. Further, the teacher has the ability to dig into the contents of a student's knowledge, especially if she is someone who has been finding interest in topics that were not on the agenda.

As for group assessment the use of essay exams and project-oriented assessment is the most appropriate for the suggested system. This would allow for students to convey the knowledge they have constructed in the most natural, unrestrictive manner. Obviously in the sciences and more practical fields, problem-based exams will still be necessary as these questions are inherently a part of disciplines like physics, mathematics, and chemistry. This does not exclude the use of Deweyan practical projects where students get to solve problems off of the page. As often as possible teachers should come up with ways for students to engage with hands-on learning. Coming up with projects is a great way to fulfill students' own interests and assess their capabilities at completing tasks and putting the knowledge they have gained into practice. Finally, allowing students to lead discussion or instruction is a great observational task that the teacher can use to see how well an individual has understood the material. Compiling

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<sup>108</sup> This may raise questions about monetary issues or class sizes that would become too big if new teachers were not immediately given their own classes. While I see these as worthwhile issues to explore, I would like to sidestep them as they get into arguments that are outside the scope of this essay.

these forms of assessment provides a more meaningful methodology of evaluation and can help in disabusing schools of bias-ridden assessments.

If schools can drop the idea that grades are *necessary* tools for motivation, then assessment can move forward in actually examining how the capabilities of our students are flourishing.<sup>109</sup> Instead of using fact-based testing, allowing students to reconstruct the knowledge in front of their teachers in the form of one-on-one dialogue, self-chosen projects, and essays will give instructors far better insight into the actual progress of the students in their ability to learn.

#### **4.4 CONCLUSION AGAINST THE IDEA OF STANDARDIZED TESTING**

Coming to the end of the chapter, I would like to take part in a discussion that many educators are having in regard to how to assess student abilities: standardized testing. Before suggesting alternative ways that colleges and employers can get a fair measure of their applicants, I would like to talk about why these tests are harmful to the entirety of the academic system—both students and teachers.

The wide range of student abilities is hard enough to capture in classroom exercises, let alone on a single test. To say someone is intelligent is not equivalent to saying that they can solve logical puzzles and read passages quickly, yet this is the precedent we are setting through the use of standardized tests like IQ tests, Iowa Tests, SAT's, and GRE's. These tests measure a

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<sup>109</sup> This point should not be heard to say that at no point in education, high school or college, should grades be used; rather, I want to point out that there alternatives to grading and that at young ages grading can be counterproductive to learning.

very specific set of abilities that are stereotypical of Einstein-like problem solvers, yet musicians, artists, writers, and directors are people who fit under many descriptions of ‘intelligent’, but their skills are easily missed on most of our standardized tests.<sup>110</sup> Howard Gardner takes on a similar stance in his book, *Multiple Intelligences*:

The uniform school [IQ-SAT evaluated school] sounds fair—after all, everyone is treated in the same way. But some years ago it occurred to me that this supposed rationale was completely unfair. The uniform school picks out and is addressed to a certain kind of mind—we might call it provisionally the IQ or SAT mind. I sometimes call it the mind of the future law professor...Your mind may turn to the brilliant chess player, the world-class violinist, and the champion athlete; certainly, such outstanding performers deserve special consideration...If they are [deserving of special consideration], then why do our tests of “intelligence” fail to identify them?”<sup>111</sup>

Not only do these tests fail their takers by pigeonholing them into displaying certain facets of their abilities (not to mention in short amounts of time and under copious amounts of pressure), but also they fail the institutes that use them. It is easy to pass up a student who has shown devoted interest to academics and has a focused mind due to a low number on a standardized test.<sup>112</sup> The same set of students seem to shine in these exams, while other groups of similar-minded students seem to struggle under these circumstances. Borrowing from Kohn:

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<sup>110</sup> A suggestion that might be made by an advocate of standardized testing is that perhaps we should not get rid of standardized testing, but instead severely modify the tests. While I would not be completely against the idea of standardized testing if they were revamped, I do not think they should be taken too seriously so as to shift the focus of students and teachers to these tests (as I will discuss below).

<sup>111</sup> Gardner, Howard. *Multiple Intelligences: New Horizons*. Basic Books: 2006. New York, NY. Pg. 5.

<sup>112</sup> In order to prevent building up a false impression of who succeeds on standardized tests, I do not want to be heard as saying that being good at standardized tests precludes one from being a good student. There is a lot of proper identification of strong-minded students from standardized tests, though, the purpose of this criticism is to show that these tests can be problematic in various ways and, given their ubiquitous use today, require some reconsideration.

Most teachers can instantly name students who are talented thinkers but who just don't do well on these exams—as well as students whose scores seem to *overestimate* their intellectual gifts. Indeed, researchers have found a statistically significant correlation between high scores on a range of standardized tests and a shallow approach to learning<sup>113</sup>.<sup>114</sup>

There are many books out there that claim they will 'boost your score' or 'get you into the top graduate program'. If these tests are things you can study for, then why do we take them to be true intelligence ratings? Do we want students to invest their time being involved in their subject of interest or studying for a generic multiple-choice test?

On the other end of the spectrum, teachers are not able to concentrate on the development of their students because they have to teach for these tests. Since institutes (e.g. the state department, universities, and some employers) fetishize these tests, teachers are threatened (sometimes with their jobs) to ensure their students do well on them. This acts as a distraction to individual progress and takes up valuable class time that is devoted to practice tests and learning problem solving tricks.

This is another method that seems to be employed due to the ease of looking at a number when browsing through a large stack of applications or, in the case of a principal, progress reports. If application committees and administrators were willing to devote more time to each student there are plenty of other ways to see whether a student is up to par. For instance, creating portfolios with the projects that the students have been involved in are a way of

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<sup>113</sup> To comment on this correlation, Kohn is pointing out that the students who do well on these tests are often the same students who take the 'memorize and forget' approach to classes. The tests are more beneficial for students who practice test-taking tactics and can 'cram' for exams; rather than students who are concerned with understanding the material on a high level and reading more at the cost of memorizing less. These two styles of learning are not necessarily mutually exclusive in a student, but he wants to point out it is usually the surface-level approach to learning that wins out on these exams.

<sup>114</sup> Kohn, Alfie. "What Does it Mean to Be Well Educated?" pg. 4.



assessing a student's accomplishments.<sup>115</sup> Sets of student essays displaying their interests and ability to piece together ideas and arguments. Lists of the classes the student has participated in and detailed narratives written by the teachers describing how the student contributed.<sup>116</sup> In the case of universities, some possible suggestions could be to administer entrance exams to students who have shown interest in the right areas, or provide more students with the chance to interview.

There are numerous suggestions that provide alternatives to standardized testing. The main point is that these tests are a paradigm in our current education systems that are full embodiments of all of the issues I have delineated in the previous sections. At the very least, we should disabuse ourselves from these forms of evaluating students as we begin the lengthy process of improving our schools.

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<sup>115</sup> I admit, however, that this view of a student alone will not always lead to a perfectly accurate representation of a student. There is the possibility of universities seeing projects that were highly imbued with the work of teachers and other students; however, taken carefully, this can be a way to see how a student's work comes to fruition – a view of an end-result that is not as easy to get from test scores.

<sup>116</sup> Of course a narrative for each individual class would become superfluous; however, particularly chosen ones for the classes that are of relevance to the application would be an enlightening supplement to a mere letter grade.

## 5.0 CONCLUDING THOUGHTS: IMPACT BEYOND PRIMARY AND SECONDARY SCHOOLS

At Stanford's 2007 graduation ceremony, former chairman of the National Endowment for the Arts, Dana Gioia, gave a speech appealing for a change in the way we treat arts education. I would like to offer up an excerpt of his speech, which represents many of the attitudes I have expressed in this essay:

There is only one social force in America potentially large and strong enough to counterbalance this profit-driven commercialization of cultural values, our educational system, especially public education. Traditionally, education has been one thing that our nation has agreed cannot be left entirely to the marketplace— but made mandatory and freely available to everyone.<sup>117</sup>

Throughout his speech he continually reminds us that American culture has severely declined from having much in the way of intellectual integrity or viewing things as valuable beyond the prices put on them. Public media does nothing to aid our youth in getting out of this trend; however, public education is one of the few things that has some distance from the corporate world.

Though I have not provided answers to all, or even most, of the problems today's society and educational situation pose, I see this system as having a number of positive effects on our current situation. An education that seeks to provide children with broad exposure to the world

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<sup>117</sup> Gioia, Dana. Commencement Lecture. University of Stanford Graduation: June 17, 2007.

of academia alone helps our youth by merely giving them things to be interested in that are not found in popular culture. More importantly, if a strong capacity for learning can be passed down to students at an early age, the impact on society could be great.

To begin with, I would like to talk about impacts my system would have on a democratic society. As was part of Dewey's project, education provides the necessary means to eliminate alienation of one's views from the culture and belief system into which one is born. One of the major themes of the 'learning how to learn' system is constant engagement with critical thinking. In a society where "every vote counts," it would be reassuring to know that the populous that is doing the voting has the means to think about whether their votes line up with their views. One would hope that people are examining whether their political stances match up to their system of values. Currently, I do not believe that many people realize what they are voting for or why they have the stances they do. It has become so simple to point to 'facts' from the news or internet articles to justify oneself that it is unnecessary to take on any other beliefs than the ones passed down by one's parents, political party, religious affiliation, etc. I realize that this is a matter of factual disposition in virtue of being born into a culture—you are being born into a way of viewing the world. An important part of education is that children should be given the means to break out of these bonds if they so choose. How education is run now, as I see it, promotes the opposite. It is only a select few that begin to really learn, and thus really think, about their views from a broader perspective.

As much of Paolo Freire's work preaches—we are allowing for oppression of the lower economic class by not endowing them with a critical mind to understand their situation (and how to change it). My appeal is that an educational system, whether it be this one or someone else's, that is aiming to train minds that are apt to challenge and reevaluate the views of the day is one

that truly supports a democracy. A democratic society with an asymmetry in education cannot flourish. There are rooms full of marketing agents, campaign directors, and advertising executives who actively try to get people to buy into their ideas with as little friction as possible. Though I cannot blame companies and politicians for doing this—it is the way to get your ideas out there in today’s world—I think we should prepare our children’s minds to question what will inevitably be told to them.

To move from political and corporate institutions to academic institutions, I see the type of education I am prescribing to be crucial for improvement in higher learning. As Stanley Aronowitz opens in his book *The Knowledge Factory*,

It is becoming harder to find a place where learning, as opposed to “education” and “training,” is the main goal. Training prepares the student in knowledges that constitute an occupation or a particular set of skills...Whatever content the school delivers, the point is to help the student adapt to the prevailing order, not assimilate its values in terms of her own priorities and interests.<sup>118</sup>

Education at the university level is no longer viewed as a way to reach a higher level of thinking, but instead is oriented around career training and indoctrination of skills that make one “marketable”. I am not trying to say it is not the student’s right to choose whether they want to be career-directed or learning-directed, but someone who cannot see *some* value in taking a science course despite wanting to practice business is not someone interested in learning of any sort. Most students want to come in to and get out of college as quickly and easily as possible. This makes sense to me based on how learning was introduced to them in primary and secondary schools. Learning is not seen as intrinsically valuable; rather, it is a way to get good grades that

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<sup>118</sup> Aronowitz, Stanley. *The Knowledge Factory*. Beacon Press: 2000. Boston, MA. Pg. 1.

get you to a good school that get you a good job. Due to this attitude, most students do not come to college prepared to learn. They have been built to ask, “Will this be on the test?”

In accordance with this attitude, professors are forced to dumb down their classes because students are neither prepared nor willing to take on challenges that do not boost their résumé. Regardless of how anecdotal it is, it is an embarrassing thing to have half of a class of students at a top-tier public university - who have taken high school physics - show up to an introductory physics course unable to use vectors or solve basic Newtonian force problems. The problem lies in the learning skills they adapt to at a very young age. Higher levels of thinking are not easily achieved through rote memorization. Imparting critical and creative thinking skills and structuring content in a logical format can provide students with a boost toward the level of thinking necessary for success at university. It is also worth mentioning that the broad connections my educational theory asks for can be seen as helping break down the two culture problem C.P. Snow identified years ago.

Most importantly, in the spirit of many philosophers of the past, education should be seen as a providing the means for happiness. A good education should allow for life-long learning. Realizing that there is no specific set of facts about history, politics, or science that will give the students the mindset needed to flourish in society is crucial to making an advancement in education. Instead it should be taken seriously that one thing we can give students that will allow them to proliferate is the ability to learn whatever it is they find valuable or interesting throughout life.

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