

Teaching Practicum at Doherty Memorial High 2011-2012

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Abstract

This IQP covers my experiences as a student teacher for science at Doherty Memorial High School in Worcester, MA during the 2011-2012 academic year. I saw this experience as an excellent opportunity to pursue teaching, which has been a career interest of mine. The teaching program here at WPI presented itself as a clear opportunity to aspire to meet the standards of these role models, and the five professional standards required of Massachusetts teachers.

Chapter 1: Background

In 1993, Massachusetts issued an act that called for education reform in the commonwealth. The ideology behind it was that if money was distributed evenly between the schools, the playing field would be leveled and each student would have equal chances of succeeding academically. By enacting focused reform over a period of time, seven years, standards would be raised and performance would improve.

This introduced the ‘frameworks’. They are a statewide curriculum that would be used by every Massachusetts student in the core subjects, such as math, biology, language and history. These frameworks would standardize the learning experience. They would also make it possible to issue a statewide, standardized test, the Massachusetts Comprehensive Assessment (MCAS). The MCAS is a result of the frameworks and the desire to see how effectively they were being implemented. The unfortunate side effect of the MCAS and its frameworks is “teaching to the test”. In many schools, classes are focused only on MCAS preparation and performance. My Honors Biology class was heavily geared towards teaching for the MCAS.

For better or worse, the frameworks create a very structured checklist of concepts the students must learn. Should the students not learn those frameworks and only garner a “needs improvement” on the MCAS, their chances of graduating would be threatened. This is known as Outcome Based Education, which measures how well the outcome of the students’ performance is, i.e. MCAS scores. Outcome Based Education has recently been touted as successful in bringing about great improvement within the last 10 years, and the proof is in the improved standardized test score during the last 10 years.

The education reform not only changed graduation standards, curriculum, MCAS performance, and the Massachusetts education budget, which nearly double in size, it changed how teachers were vetted. They must now prove competency in their chosen subject by passing the MTEL, Massachusetts Test for Educator Licensure, and they must also meet the five professional standards: plans curriculum and instruction, delivers effective instruction, manage classroom climate and operation, promotes equity, and meets professional requirements.

Perhaps directly related to the education reform is the effect on statewide performance. Massachusetts public education has consistently ranked among the top 10 in the nation. Graduation rates are relatively high, usually in the 80% area. On a nationwide level Massachusetts schools are among, if not *the*, best. On an international level, by virtue of the Trends in International Mathematics and Science Study (TIMSS), Massachusetts has outperformed all other states in the US and “The state of Massachusetts was outperformed only by the top-performing country of Singapore”. These results are seen to validate both the MCAS testing and the new MTEL guidelines for teachers.

[Worcester Public Schools and Doherty Memorial High School](#)

Worcester Public Schools consists of forty-four schools serving Worcester, Massachusetts in the Worcester Public School District. Of these forty-four schools, seven are high schools. Doherty Memorial High School is within the Doherty (west) Quadrant, which is one of four, the others being the North, South and Burncoat (east) quadrants.

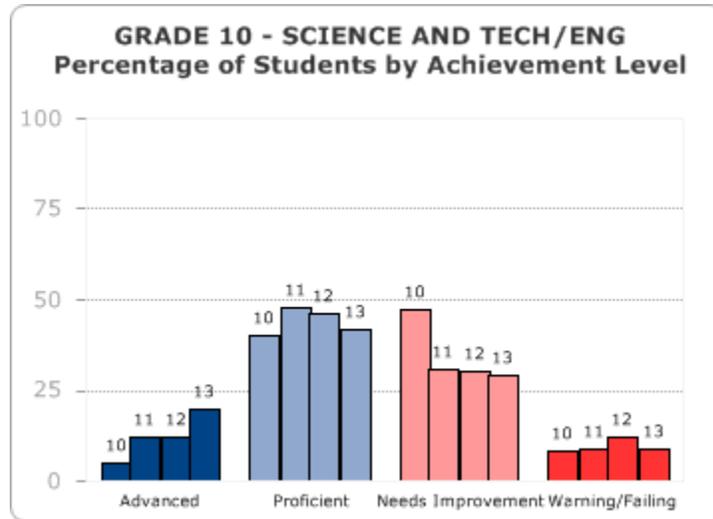
The gender and racial makeup of the Worcester Public Schools is not too different from the state. There are more boys than girls both in Doherty and the district, as well as the state. There are also a greater percentage of minority racial groups. The charts below show the breakdown for Doherty specifically, which had over 1300 students enrolled in the 2013-2014 year.

Enrollment by Gender (2013-14)			
	School	District	State
Male	683	12,735	489,422
Female	654	11,827	466,317
Total	1,337	24,562	955,739

Enrollment by Race/Ethnicity (2013-14)				
Race	% of School	% of District	% of State	
African American	14.1	14.5	8.7	
Asian	9.3	7.7	6.1	
Hispanic	30.3	38.0	17.0	
Native American	0.6	0.2	0.2	
White	43.4	35.8	64.9	
Native Hawaiian, Pacific Islander	0.0	0.0	0.1	
Multi-Race, Non-Hispanic	2.2	3.8	2.9	

When compared with the state, Worcester Public schools tend to not perform quite as well on the MCAS. They have fewer students receiving proficient and advanced, and more needs improvement or failing. This difference in performance carries through to all areas of MCAS testing, not just science. While this is evident looking at Doherty's comparison to the state, their performance seems to have slightly improved within the last year. In general, science is a more

difficult MCAS exam for many students, receiving lower scores than the mathematics and English exams.



Finally, graduation rates in the Worcester Public Schools is nearly 10 percent lower than those in the rest of the state, with the state at 85% and Worcester at 73.4%. Worcester is a low-income, urban area, and schools in these kinds of regions often have difficulty graduating students at high rates. The four year graduation rates for the Worcester Public School district can be seen below.

4-Year Graduation Rate (2013)							
Student Group	# in Cohort	% Graduated	% Still in School	% Non-Grad Completers	% GED	% Dropped Out	% Permanently Excluded
All Students	1885	73.4	11.3	1.3	2.8	11.0	0.2
Male	953	69.5	12.9	1.2	3.0	13.2	0.2
Female	932	77.5	9.7	1.5	2.5	8.8	0.1

ELL	581	70.4	15.0	2.9	0.9	10.8	0.0
Students w/disabilities	526	53.0	23.2	1.9	2.9	18.8	0.2
Low income	1543	70.6	12.4	1.4	3.0	12.4	0.2
High needs	1636	70.5	12.7	1.5	3.0	12.2	0.2
Afr. Amer./Black	320	76.9	9.1	2.2	2.2	9.4	0.3
Asian	181	85.6	5.5	1.7	2.2	5.0	0.0
Hispanic/Latino	716	63.1	15.5	1.5	2.9	16.8	0.1
Amer. Ind. or Alaska Nat.	7	42.9	0.0	0.0	28.6	28.6	0.0
White	636	79.9	9.7	0.6	2.8	6.8	0.2
Nat. Haw. or Pacif. Isl.	1	-	-	-	-	-	-
Multi-race, Non- Hisp./Lat.	24	79.2	4.2	0.0	0.0	16.7	0.0

Chapter 2: Plans Curriculum and Instruction

The first professional standard for Massachusetts teachers is to plan the curriculum and instruction. The nine subsections are as follows:

1. Draws on content standards of the relevant curriculum frameworks to plan sequential units of study, individual lessons, and learning activities that make learning cumulative and advance students' level of content knowledge.
2. Draws on results of formal and informal assessments as well as knowledge of human development to identify teaching strategies and learning activities appropriate to the specific discipline, age, level of English language proficiency, and range of cognitive levels being taught.
3. Identifies appropriate reading materials, other resources, and writing activities for promoting further learning by the full range of students within the classroom.
4. Identifies prerequisite skills, concepts, and vocabulary needed for the learning activities.
5. Plans lessons with clear objectives and relevant measurable outcomes.
6. Draws on resources from colleagues, families, and the community to enhance learning.
7. Incorporates appropriate technology and media in lesson planning.
8. Uses information in Individualized Education Programs (IEPs) to plan strategies for integrating students with disabilities into general education classrooms.
9. Uses instructional planning, materials, and student engagement approaches that support students of diverse cultural and linguistic backgrounds, strengths, and challenges.

I taught several classes at Doherty Memorial High School throughout my 2011-2012 practicum. I was also taking 2 classes at WPI, so the amount of courses I taught varied by term. Honors Biology and Level 1 Physics were the main two classes I taught. Level 1 Human Anatomy, which is an elective, was picked up at the beginning of the new semester and over the holiday break from WPI for about 2.5 weeks, I picked up another Honors Biology class.

My mentor, Brian King, has been teaching at Doherty for over 10 years and no longer has any written lesson plans, being so familiar with the material. With none to reference, I was able to experiment to find what style would work best in lesson planning. Using the MCAS standards mostly, the textbook, and supplemental NY regent's information, I prepared lesson plans that I hoped would help best prepare the students for the MCAS.

I also looked to my own experiences as a student to see how my teachers taught and modelled that. I began what most of my teachers had done, I used the material from the textbook to guide my plans. My mentor told me which chapters needed to be covered and I took it from there.

When possible I would supplement with the Frameworks, which was most of the time, but the textbook was the foundation upon which my lesson plans were built and structured.

I attempted to build my lesson plans by the week. They were basic frameworks that could be flexibly adapted throughout the week depending on progress. The most challenging part of lesson planning was planning the use of time. Classes were forty minutes long, except once a week there would be a long period. It was vital that the lesson plan be easy to change because progress could be easily stalled by both distractions and discipline or by need of a more thorough explanation. For this reason my daily course preparations involved thorough notes on what I planned to teach in that lesson. Even if the lesson got substantially delayed, I would know where lesson had been interrupted and would be able to continue teaching after the distraction or carry the lesson over to the next class.

My class plans would also include specific objectives for the students, such as homework deadlines, quiz dates, reading assignments, and the general topics of the week or day. The first few minutes of each class were always dedicated to touching on the weekly agenda and reminding students of important upcoming dates for the class. To make sure that students

remained cognizant of previous lessons, most classes would then have “Do Now” or “Recall” activities. “Do Now” assignments were short, two to three question quizzes at the beginning of class that would overview previous material. “Recall” was an activity where students were prompted to remember anything they could about a previous lesson. Both activities were ungraded so that students wouldn’t get anxious. These activity would have students remember previous information, and provide a transition towards the upcoming lesson, hopefully building a web of interconnected lessons for the students.

After reviewing the class agenda and a “Do Now” or “Recall” activity, the class would either review recent homework assignments or begin a lesson. Reviewing homework assignments was done by having students come up to the board and write down their answers, and discussing as a class, or by me asking the students what they found most difficult, and answering the problem as a group. The results of these group homework reviews were extremely helpful as they allowed me to tailor my upcoming lessons for what the class found most difficult about the material.

The basic approach to planning a class that I developed at Doherty was to plan the content using the textbook and MCAS requirements, then review how well the students had retained the information using “Do Nows”, “Recalls”, and homework review. This student feedback helped me then plan for future lessons, and anticipate the needs of specific students as well as the class as a whole.

Chapter 3: Delivering Effective Instruction

The second professional standard for Massachusetts teachers is to deliver effective instruction.

This is clearly a broad goal, and the standards reflect that with quite the array of requirements:

1. Communicates high standards and expectations when beginning the lesson:
 - a. Makes learning objectives clear to students.
 - b. Communicates clearly in writing, speaking, and through the use of appropriately designed visual and contextual aids.
 - c. Uses engaging ways to begin a new unit of study or lesson.
 - d. Builds on students' prior knowledge and experience.
2. Communicates high standards and expectations when carrying out the lesson:
 - a. Uses a balanced approach to teaching skills and concepts of elementary reading and writing.
 - b. Employs a variety of content-based and content-oriented teaching techniques from more teacher-directed strategies such as direct instruction, practice, and Socratic dialogue, to less teacher-directed approaches such as discussion, problem solving, cooperative learning, and research projects (among others).
 - c. Demonstrates an adequate knowledge of and approach to the academic content of lessons.
 - d. Employs a variety of reading and writing strategies for addressing learning objectives.
 - e. Uses questioning to stimulate thinking and encourages all students to respond.
 - f. Uses instructional technology appropriately.
 - g. Uses effective strategies and techniques for making content accessible to English language learners.
 - h. Demonstrates knowledge of the difference between social and academic language and the importance of this difference in planning, differentiating and delivering effective instruction for English language learners at various levels of English language proficiency and literacy.
3. Communicates high standards and expectations when extending and completing the lesson:
 - a. Assigns homework or practice that furthers student learning and checks it.
 - b. Provides regular and frequent feedback to students on their progress.

- c. Provides many and varied opportunities for students to achieve competence.
4. Communicates high standards and expectations when evaluating student learning:
- a. Accurately measures student achievement of, and progress toward, the learning objectives with a variety of formal and informal assessments, and uses results to plan further instruction.
 - b. Translates evaluations of student work into records that accurately convey the level of student achievement to students, parents or guardians, and school personnel.

The overall message of the requirements is that the teacher effectively communicates through speech, writing, and visual aids, and effectively uses these methods to communicate knowledge, course objectives, homeworks, and when determining student learning.

My initial approach to teaching the class was to start each day by writing on the board, as this is what I had seen my mentor do. Mr. King was a tall man so he could quite literally fill the board with lesson notes, and then cover these during the class. As a short female, I could not follow his example, though I tried initially and realized I couldn't write high enough up on the board so that students throughout the class could all read the information.

I would also use primarily vocal activities at the start of class, rather than visual. My "do nows" and "recalls" at the start of class allowed me to both gather the attention of the students as well as to assess their progress. These activities were ungraded, so that students could feel at the start of most days that they were prepared for the upcoming lesson. I tried to be very interactive with the students during the overhead project lessons as well, actively seeking questions from the students by addressing the class. This felt even more important to me because I had to be tied to the projector during the lesson.

My solution to this difficulty in communicating information to the class was to use an overhead projector with transparencies. These transparencies would either be prepared before class, or taken from lesson plan notes during so that the students could work with me. I understood both

from my own experience and from watching the students that spending too much time at the overhead, even with vocal interactions, was overly monotonous. After some experience with bored students, I decided to try and break up the overhead projector lessons by focusing on a point and walking around the classroom, trying to make visual or physical metaphors for whatever was being taught.

I felt that the best way to assess the students was to quiz students using questions from old MCAS exams. This way, students would be familiar with the format. The lessons were often structured around old MCAS exam questions, so that if the students read their notes, they would directly reveal the answers to quizzes or tests. I felt that this consistency between the daily learning activities and the assessments were critical to communicating to students their progress and my expectations.

Chapter 4: Managing the Classroom

The third professional standard to be addressed for Massachusetts teachers is to manage the classroom climate and operation. The requirements for this standard can be seen below:

1. Creates and maintains a safe and collaborative learning environment that values diversity and motivates students to meet high standards of conduct, effort and performance.
2. Creates a physical environment appropriate to a range of learning activities.
3. Maintains appropriate standards of behavior, mutual respect, and safety.
4. Manages classroom routines and procedures without loss of significant instructional time.

Classroom management, like most beginning teachers I'm sure, made me very anxious. It feels like the first day of school, but instead of being one of many students, everyone stares at you and wonders why you're standing in the front of the room. This felt especially true to my experience as a short, young looking female. The students in my physics class were only a scant 3 years younger than me. Maintaining order and authority in that environment presented me with many challenges.

At first my uncertainty as a new teacher and my unfamiliarity with the role I played resulted in unruly classrooms. I would try to use vocal activities in all my lessons, however, without classroom attention, a vocal activity can quickly devolve into lunchroom behavior. The biggest problem for me though was deciding how I could regain classroom control in these situations. I wasn't sure what types of reprimands would be effective in various situations, and I had brought in several idealist approaches after my observations of Mr. King that I realized were unfeasible in the teacher's position. One initial thought was to remove all cell phones at the start of classes, but I was told I would be financially responsible for these phones if I did so, and this would be abused by clever students. Also, I felt that teacher-parent interaction could be used for reprimanding or rewarding students, but Mr. King felt that the parent's lack of interest would

make this impossible; many students also had only 1 parent or lived with grandparents, nixing this idea.

Eventually I became more confident in how I filled the teacher's role in the classroom. I didn't feel that I made any conscious changes as to how I approached students in good or bad classroom situation, but classroom behavior slowly improved. I attribute this to the solidifying of my role both internally and with the students, and my consistent behavior towards them made my rules and limits clear.

Chapter 5: Promoting Equity

The fourth professional standard for Massachusetts teachers is to promote equity among students.

1. Encourages all students to believe that effort is a key to achievement.
2. Works to promote achievement by all students without exception.
3. Assesses the significance of student differences in home experiences, background knowledge, learning skills, learning pace, and proficiency in the English language for learning the curriculum at hand and uses professional judgment to determine if instructional adjustments are necessary.
4. Helps all students to understand American civic culture, its underlying ideals, founding political principles and political institutions, and to see themselves as members of a local, state, national, and international civic community.
5. Collaborates with families, recognizing the significance of native language and culture to create and implement strategies for supporting student learning and development both at home and at school.

There are a couple clear facets to this professional standard as denoted by the various requirements: fairness towards all students, valuing all student effort regardless of results, being respectful of students with varying cultural, racial, and socioeconomic backgrounds, and being sensitive to the challenges students may face outside of school. I feel that if a class was full of well-mannered students, promoting equity would almost not be a concern; keeping students excited and being sensitive to their needs is a simple task when everyone has a positive outlook at the start. Obviously students still need varying activities and lessons to remain interested, and I feel my class activities led to high student interaction.

One of the great challenges to promoting equity, though, was how to work around difficult students. This includes students that would challenge me often, easily distracted students, and students that would purposefully undermine class attention and productivity. Dealing with these

behaviors requires a lot of attention and time from the teacher, which makes it unfair for the rest of the class. Figuring out what makes each difficult student 'tick', and addressing it, brings equity into the classroom and improves the learning experience for the whole class.

I also dealt with cultural gaps with several Albanian students. This affected their learning greatly as English was their second language. To accommodate their needs, I would give them the lecture slides so that they could focus on the material rather than spending all of their time simply struggling to write the same notes that I was writing.

Chapter 6: Meets Professional Responsibilities

The fifth and final professional standard for Massachusetts teachers is to behave as you'd expect a responsible adult to behave in a teacher's situation. The requirements for this are:

1. Understands his or her legal and moral responsibilities.
2. Conveys knowledge of and enthusiasm for his/her academic discipline to students.
3. Maintains interest in current theory, research, and developments in the academic discipline and exercises judgment in accepting implications or findings as valid for application in classroom practice.
4. Collaborates with colleagues to improve instruction, assessment, and student achievement.
5. Works actively to involve parents in their child's academic activities and performance, and communicates clearly with them.
6. Reflects critically upon his or her teaching experience, identifies areas for further professional development as part of a professional development plan that is linked to grade level, school, and district goals, and is receptive to suggestions for growth.
7. Understands legal and ethical issues as they apply to responsible and acceptable use of the Internet and other resources.

Whenever I think back to my professional responsibilities as a student teacher at Doherty, one interesting anecdote comes to mind: none of the students ever learned my first name during my time there up until my final day. They only knew me as Ms. DeVito, or simply 'Miss'. I view this as a good thing, because maintaining the gap between professional young adult and being potential peer of the student was an exceptionally important gap to have, given my young appearance and height.

I had an enlightening experience fulfilling the professional requirements of a teacher being asked to participate in a parent-teacher conference. One parent had been concerned that the disruption of a bringing a student teacher into her daughter's class would negatively affect her daughter's education and her performance on the MCAS, which drove the whole course. I discussed how to

handle this matter with my colleagues and my mentor, especially since the parent in question was well known for 'haranguing' teachers. Dealing with this event led me to reflect on my performance and forced me to defend my role as a competent teacher.

Chapter 7: Your WPI education

My WPI experience helped prepare for teaching at Doherty by presenting me with a series of challenges that I had to be flexible to meet. Truth be told, my experience at WPI has been filled with difficulties, personal and academic. I found that my experience at Doherty was much the same, so the one way WPI did excellently prepare me was with the persistence I needed to overcome many adversities.

The actual content of many of my Doherty classes was not really related to the content I had learned at WPI. This meant that much of the material I would teach to the students, I would have to learn again myself beforehand. Obviously this wasn't an ideal situation for me or the students, but compared to the academic rigor of WPI this wasn't a large challenge, and I think I prepared my students well.

Being simultaneously a student and a teacher was a formative experience for me, and definitely shifted how I viewed teaching at the high school level. When my students complained of complications outside the classroom affecting their performance, I could not help but relate to their issues as my WPI experience has been less than ideal. I think this made me into a better teacher, as this empathy helped me to connect with students and motivate them as much as I could.

I took several courses during in preparation for my student teaching experience that helped me form good teaching habits. The first was a psychology of education class. This course really helped me pinpoint my own personal learning style, as well as defining the learning styles of my students. Most importantly, I also had to carefully consider how to teach each separate learning style once I figured my students out. These lessons encouraged me to try new things each day to reach out to students with different learning styles.

As part of my practicum requirements, I also took the Teaching Methods course. This course allowed me to get my first practice in being a teacher. The course offered many different ways to teach science and mathematics to different types of students, and the great feedback and care my Professors taught the class with demonstrated a degree of excellence that I hoped to embody as well. The only downside to this course is that it focused heavily on the use of technology to aid in learning, especially in science. At Doherty, the highly limited resources for teachers and students alike mean that all of these lessons went to waste, and I was unprepared to deal with the circumstance surrounding teacher resources when I first arrived.

Chapter 8: Your classes

Like any teacher, I had a wide variety of students who came to me with different socioeconomic, cultural, and educational backgrounds. Achieving my goal as a teacher, which is to lead all of the students to perform at their best, is made more challenging and more interesting by the differences between my students. My own experience teaching to such a large variety of students, all having different skills and personalities, was nonexistent coming into Doherty. If anything, Doherty gave me an amazing opportunity to interact with them all, and to have a greater appreciation for the realities of the public school system.

Honors Biology

This class was composed of mostly 9th and 10th grade students. Most of the students belonged to the white middle class demographic. This was quite unlike my other courses, which were predominantly low income students. And quite unlike my other classes, and the school as a whole, was that over half the class was composed of girls (18 out of 31). These factors all combined for a much different class dynamic than I experienced during observation and student teaching in other classes.

These differences made a large impact on the behavior of the class. I almost never had to use any type of disciplinary action. Also, the students would come much more prepared for the upcoming class than I experienced elsewhere. Other tangible aspects of the students, such as their focus when completing assignments, and their interest during lessons was better. They had higher expectations for themselves and me, and vice versa.

Level 1 Physics

This class was smaller, only 15 students of mostly low income minority socioeconomic backgrounds. The difference between this group and the Honors Biology group was stark; while

the honors students were self-motivated, the Level 1 Physics students did not seem to be, and I don't even think they needed the class to graduate. Without much internal or external motivators, classroom behavior, focus, and interest was dismal. A large portion of the time I spent was simply to control the behavior of the students, and repeat previous lessons. Course attendance was a significant issue that was out of my control.

A large problem was the educational background of the students. Often while conducting lessons, I would have to reteach fundamental concepts of physics that they should have learned previously. This challenge would always come as a surprise, requiring flexible lesson planning and patience to meet the goals I had set for the class.

Human Anatomy

The human anatomy course was similar to the Level 1 Physics class above in both student background and student participation. However, the class was larger, with 22 students. This meant controlling the behavior of the classroom was the primary challenge on a daily basis. Also in this class were my two Albanian students, and many Spanish first language speakers, so cultural differences and challenges with understanding my instruction were common issues in the course. Additionally, there were several special needs students who participated in the class, though not fully. They were not part of the class roster, but sat in on a daily basis. This effectively increased the class size as well.

Constant issues in this class as well as Level 1 Physics were cell phones and, somewhat surprising to me, food. Cell phones present an obvious and constant problem for teachers, forcing us to battle for their attention (and I felt I was destined to lose, teaching science). I was only once forced to reprimand a student for cell phone use. Also a concern was food in the classroom, as this diverted student attention greatly, and made a big mess!

Conclusion

Going into the student teaching experience, I was full of idealistic notions, a romanticized view of teaching. I quickly learned at my experience at Doherty that teaching was actually a very rigorous profession, not for those who are faint of heart. The challenges of both teaching, managing the classroom, and remaining motivated to help every student can be insurmountable for those without a strong passion for education. While the work of the education reforms in Massachusetts has clearly been effective, I have seen that at the classroom level it does not necessarily benefit every student. The five professional guidelines for teachers provides broad enough requirements for teachers to aspire for success by them, and I think that the excellent teachers these guidelines can help make will be more crucial in improving secondary education in Massachusetts and elsewhere.

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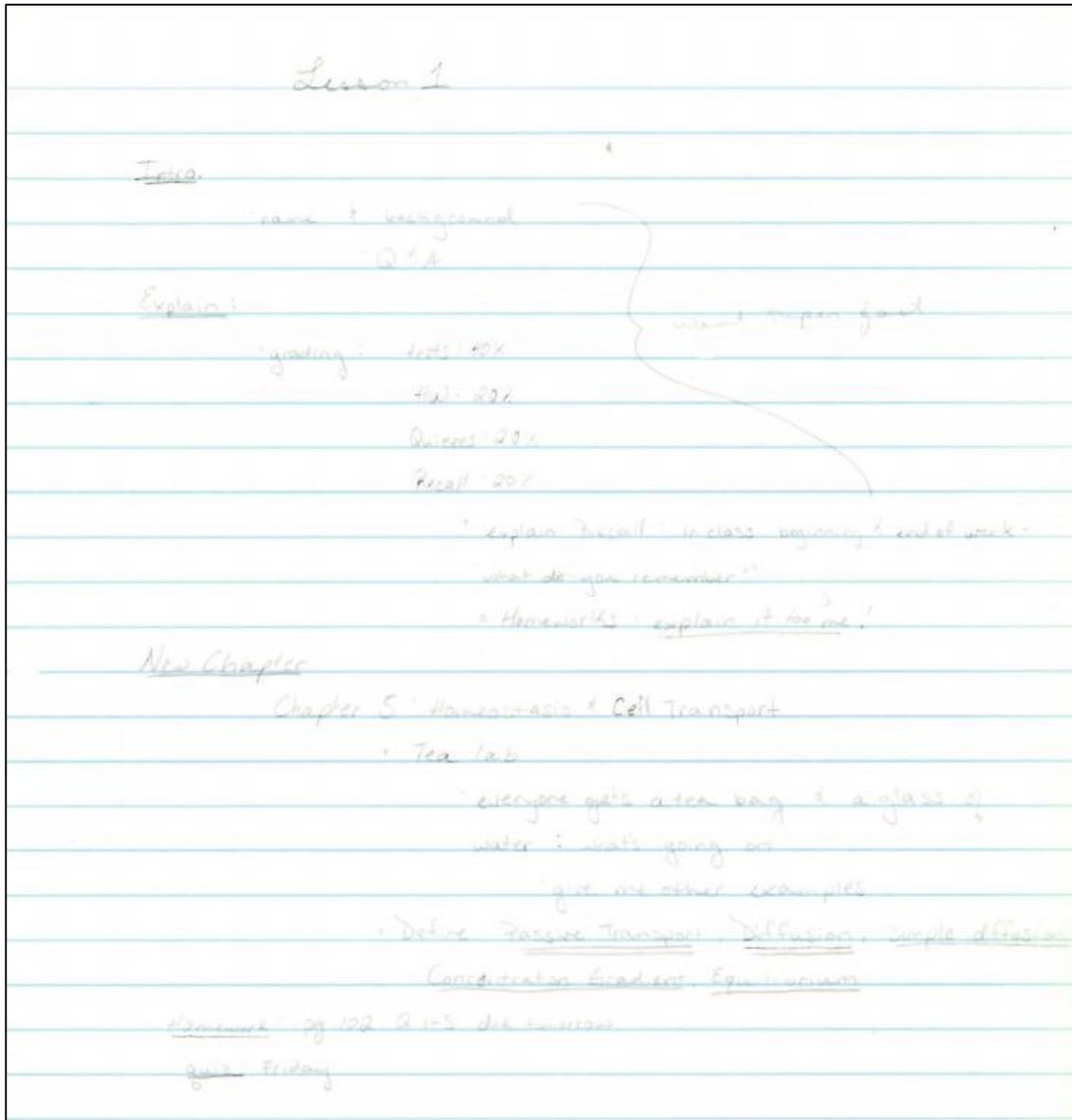
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Appendix A: Lesson Plans

First Lesson Plan



Hard to see, but this was my first lesson plan. It details course objectives for the students, and introduces the objectives for the first chapter I'd be teaching, a short lab for students to learn diffusion using tea bags, and reminds me to tell the students of upcoming assignments.

Cellular Respiration Lesson Plan

Lesson Plan

14/11/2011

Topic: Cellular Respiration

Types of Cellular Respiration
(ATP)

Aerobic

1st: Glycolysis (anaerobic)

2nd: Krebs's Cycle

3rd: Electron Transport Chain

Anaerobic

Fermentation

go over glycolysis; Cellular Respiration's purpose

HW: Read Textbook pgs 131-136; pg 136 1-3

Agenda

- check HW
- Recall: Photosynthesis
- Cellular Respiration: glycolysis
- HW for the night

* packaging: baking ingredients → heat → food

Cellular Respiration

ATP is the energy currency

Glucose → energy

$C_6H_{12}O_6 + 6O_2 \xrightarrow{\text{cellular respiration}} 6CO_2 + 6H_2O + \text{Energy}$

Energy → heat, 38 ATP's (for all processes)

glycolysis: glucose splits, break apart

glycolysis: $C-C-C-C-C-C$ breaks the carbon back bone in 2

↓

$C-C-C$ → Krebs Cycle → 2 ATP

requires O_2

ETC

↓

Fermentation (no O_2)

humans: lactic acid

yeast: alcohol + fermentation

glycolysis: anaerobic - 2 ATP's net

↓

Krebs Cycle: aerobic - 2 ATP's

↓

Electron Transport Chain: aerobic - 34 ATP's

$NAD^+ \rightarrow NADH$

$FAD \rightarrow FADH_2$

used in ETC, produce 3 ATP's each

Chapter 5: Homeostasis & Cell Transport

Passive transport: the movement of substances across a cell membrane without the use of energy by the cell.

- Diffusion: the movement of molecules from an area of higher concentration to an area of lower concentration.

Concentration Gradient: The difference in the concentration of molecules across a distance.

* tea

bring in the bags
pass on desk
have them put
the tea bag in
water explain
what happens
pour away into diffusion

Equilibrium: the concentration of molecules will be the same throughout the space the molecules occupy.

- Simple diffusion: diffusion across a membrane only allows certain molecules to pass through the membrane

* the class to explain concentration
dishes & evenly spread

- Osmosis: The process by which water molecules diffuse across a membrane from an area of higher concentration to an area of lower concentration.

hypotonic: when the concentration of solute molecules outside the cell is lower than the concentration in the cytosol.

- Cytosol: the soluble portion of the cytoplasm which includes molecules & small particles, such as ribosomes, but not the organelles covered w/ membranes

hypertonic: when the concentration of solute molecules outside the cell is higher than the concentration in the cytosol.

Fundamentals of Genetics Lesson Plan

Chapter 9: Fundamentals of Genetics

19/02/2011

Sec. 1 - Mendel's Legacy

Genetics: the field of biology devoted to understanding how characteristics are transmitted from parents to offspring
- field founded by Gregor Mendel's work

Gregor Mendel 1843 (Brno) entered as monastery in Brno, Austria, tended gardens

1851 - entered Univ of Vienna to study science & math

- heredity transmission of characteristics from parents to offspring

returned to teach H.S. (kept a plot); used Pisum sativum a species of garden pea

Mendel's Peas

observed 7 characteristics

↳ heritable feature (ie. flower color)

TRAIT: a genetically determined variant of a characteristic (eg. yellow flower color)

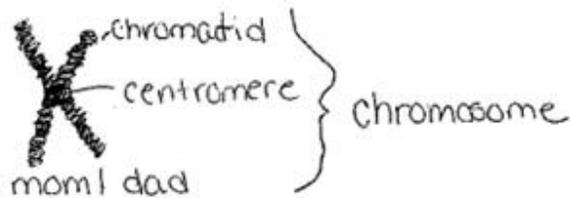
<u>Characteristics</u>	<u>traits</u>	- he kept the seeds & planted them next year to observe variation/continuity
plant height	long/short	
flower position ^{along} stem	axial/terminal	
pod color	green/yellow	
pod appearance	inflated/constricted	
seed texture	round/wrinkled	
seed color	yellow/green	
flower color	purple/white	

Appendix B: Recall Activity

December 8, 2011

What do you know about chromosomes?

- made up of DNA + proteins tightly coiled into chromatids. called haploids
- 2 chromatids make up a chromosome
- uncoiled chromosomes are called chromatin.
- the thing that connects the 2 chromatids is called a centromere.



- you have 46 chromosomes ; 23 pairs
2 of them determine your sex ; are called sex chromosomes
- XX = girl
xy = boy
- you get one of each chromosome from mom + the other from dad
- called homologous pairs.
- a picture of all chromosomes during cell division is called a karyotype.

Appendix C: Overhead Notes

Chromosome Overhead

Cell Reproduction

5/12/2011

DNA: long thin molecule that stores genetic info.

Chromosomes: DNA & proteins; highly coiled & compact, they are in the nucleus of eukaryotic cells

* Right before cell division, DNA coils to form chromosomes

Chromatin: less tightly coiled DNA-protein complex; before & after cell division

Centromere: the point where 2

chromatids are attached.



Genetics Overhead

Ch. 9 : Fundamentals of Genetics

20/12/2011

Genetics : the study of genes

Gregor Mendel (Father of Genetics)

1843: 21 yrs old : monastery
tended the gardens

1851: University of Vienna
Studying math & science
• statistics

→ teaches H.S. & kept a plot of pea plants
Pisum sativum (type of garden pea)

Mendel's Peas

- observed 7 characteristics
↳ heritable feature

Characteristics

- seed color
- flower color
- pod color
- seed texture
- plant height
- pod appearance
- flower position

Cell Transport Overhead

Chapter 5: Homeostasis & Cell Transport

Homeostasis: maintaining the balance

Passive Transport: the movement of substances across a cell membrane without the use of energy by the cell.

Diffusion: the movement of molec from an area of higher concentration to area of lower concentration.

• Simple Diffusion: diffusion across a membr
• only certain molecules to pass through the membrane

• Concentration Gradient: the difference in the concentration of molecules across a distance

• Equilibrium: the concentration of molecules will be the same throughout the space the molecules occupy.

Appendix D: Quizzes and Tests

On the following pages appear several quizzes and tests that I used to assess the progress of my students.

Name _____

Date _____

Period 4 Honors Biology

Chapter 5 Quiz: A

Short Answer: Answer in as much detail as possible. (2 pts each)

1) What is the difference between diffusion and osmosis?

2) Diffusion always goes from a _____ concentration to a _____ concentration.

Why?

3) How is passive transport different from active transport?

4) What two conditions stop diffusion? Why?

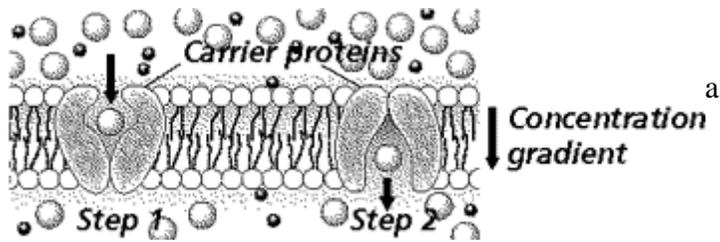
5) Can diffusion help save the world? How?

Multiple Choice: Choose the answer that best fits the question. (1 pt each)

6) What type of transport occurs in the cell without energy?

- a. Passive Transport
- b. Active transport
- c. Osmosis
- d. Plasmolysis
- e. Turgor Pressure

7) What cell process is responsible for the effect shown below?



- a. Osmosis
- b. Active Transport
- c. Facilitated Diffusion
- d. Passive Transport

8) In diffusion the molecules move _____ the concentration gradient.

- a. up
- b. across
- c. over
- d. down
- e. under

9) Allowing certain molecules to diffuse across the membrane is...?

- a. diffusion
- b. osmosis
- c. simple diffusion
- d. ionic

10) Isotonic: regular shape

Hypotonic: bloats

Hypertonic: _____

- a. nothing
- b. widens
- c. expands
- d. dies
- e. shrivel

11) In a hypertonic environment the water leaves the cell through osmosis and turgor pressure is lost which is called _____.

- a. Cytolysis
- b. plasmolysis
- c. facilitated diffusion
- d. turgor pressure

12) The bursting of a cell is _____.

13) When _____ transport ions from higher to lower concentrations they are a form of passive transport. (2 words)

14) The process when molecules cannot be readily diffused through the cell membrane is _____. (2 words)

15) In facilitated diffusion the movement of these molecules is assisted by _____.

Name ___ **Answer Key** _____

Date _____

Chapter 9: Genetics

Pop Quiz: Period 7

1. Who is the father of genetics?

Gregor Mendel

2. What year did he (the father of genetics) attend the University of Vienna?

1851

3. What breed of garden pea did Mendel use?

Pisum sativum

4. What are the seven characteristics Mendel observed?

Seed color, flower color, pod color, seed texture, plant height, pod appearance, flower position

5. If you looked in the flower of a pea plant, which reproductive organ would you see? Why?

Both the anther and the stigma, because the pea plant Mendel used could self pollinate, which requires both male and female reproductive organs.

Name _____

Date _____

Momentum: quiz

Physics period 2

Directions: Please answer each question using GFESA; include the units and the values. Write as clearly as possible.

- 1) A 4500 kg semi-truck has a velocity of 27 m/s south. What is the momentum of the truck?
- 2) A 2 kg basketball is thrown north with 79 kg*m/s of momentum. What was its velocity?
- 3) A 1378 kg car is speeding eastward with a velocity of 27 m/s. It collides with tree and is brought to rest. If this takes .5 seconds, what was the force exerted on the car when it collided with the tree?
- 4) A 2222kg car travelling at 33 m/s starts to brake. If the brakes apply an effective braking force of 1000N, how long did it take the car to come to a complete stop?

Name _____

Date _____

Physics: Work

Quiz A

Please show all of your work using GFESA.

- 1) A force of 827 N is applied to a roller-coaster car to push it horizontally. If 3510 J of work is done on the car, how far has it been pushed?
- 2) How much work does Fred do exerting 45 N to lift a box 3.2m?
- 3) Katherine is riding her bike up a hill, going 2 m/s^2 . If she weighs 80 kg, how much work will she do over 500 m?
- 4) The average light bulb exerts 100 watts of power. If it is doing $1.83 \cdot 10^4 \text{ J}$ of work, how long will it last?
- 5) A light exerts 6 watts of power over 7 hours. How much work did it do?