



Teaching One Subject Through Six Different Methods

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VIU EDPB 503 – Child and Youth Development

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# **Nightschool and the Cube of Comprehension**

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## The Subjects

### 1. Kanye

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Kanye is a 13 year old African-American male, who has been adopted by an upper middle class white family in Portland, Oregon when he was a baby. His adoptive parents have long divorced, and his father (who suffers from morbid depression) has since remarried a younger woman who is kind, patient and creative, and will do just about anything to make him happy. His biological parents had some drinking issues, but not enough to constitute Fetal Alcohol Syndrome Disorder. He is currently on ninth grade, and has been diagnosed with Attention Deficit Hyperactive Disorder; he may have a touch of Tourette's. Against the advice of doctors and teachers, his parents refuse to medicate him. Kanye is a kinesthetic learner, and regular school is an issue for him. He is struggling on subjects which require taking an abstract concept and turning it into a concrete idea. Because of this, he has issues with following logic in sciences and math. His marks average around a C.

According to Piaget's developmental stages, he is in period III of development, as he needs concrete activities to help him understand subjects.

Kanye is a handful of endless, physical energy; while he is beloved by people in school and extremely popular, his constant talking is distracting during classes. He feels the need to be the

centre of attention. He makes voices constantly, imitating his favorite characters from TV, and comes up with different ways to make people laugh; this includes some very disgusting and sometimes inappropriate comments, off-colour jokes, random words, and other distractive behaviour. For instance, when something goes well, instead of “It’s all good,” he says “It’s all tits.” When Kanye is happy, he doesn’t just do a little dance – he does a full-on bacon dance with real bacon strips, and rubs them all over his chest and stomach. He also hides behind corners and jumps people to drop them to the ground – not just his siblings, but everyone. Despite all of this immature behaviour, it is hard for others to be upset at him as he is very lovable and empathetic towards other people.

Kanye’s favourite activities are listening to music, playing video games, eating, hanging out with his friends and reading comic books. He also loves playing board games with his siblings and parents. He has a brother and two sisters. His brother is biologically son of his adopted parents, while his older sister was adopted from a Vietnamese student who got pregnant while in school and could not care for the baby. The youngest sister is a bit of a fish out of water, as she is the daughter of his father’s younger wife, and is about three years younger than everyone else. The three older siblings get together fabulously; even though his sister and brother don’t have a lot in common, Kanye serves as the glue that keeps them together.

Kanye is overweight and has very unhealthy eating habits. He still wets the bed sometimes during the night, and throws up when nervous or upset. Kanye secretly struggles with finding his path in life; he believes that while all of his friends have their future figured out, he doesn’t, and he believes the reason for this is, he is not good at anything. His confidence may seem big and loud, but deep inside he has concerns for the future, low self-esteem and a sense that making people laugh is all he has.

## 2. Vaylin



Vaylin is Kanye's sister, and she is also on ninth grade. She was adopted as a baby as well. Her mother went into the navy short after she gave birth, and her father – an African-American man – was a young student who was not ready to be a father yet. They were both healthy students; Vaylin's personality reflects the goodness and

calm of the world. She has always seemed very mature for her age, and has yet to throw a typical teenage fit.

At home, she loves all three of her parents. She is caring, respectful and thoughtful. In school, she is considered a perfect, straight A student; her marks are always high, her books are always tidy, she never misses homework. She is a visual learner with an excellent memory, and can remember anything she reads. Vaylin is not very innovative in her assignments and writing, and tends to play it safe.

According to Piaget's developmental stages, she is in period IV of development, as she is able to think systematically regarding abstract ideas.

She is organized in everything in life; in her room, there is a place for everything, and everything has its place. Vaylin is sweet, with a kind heart and a very good disposition. She has recently started struggling with harder subjects, but mainly because she has become more physically mature for the past year, and has grown into a tall, slim young woman; she is starting to get

attention from boys, and is afraid of seeming overly smart. She started repeating phrases such as “Math is hard”. Vaylin’s favourite activities are reading, playing The Sims and hanging out with friends. She also loves going to the mall.

Despite her looks, Vaylin is insecure and plays it safe on most occasions, following trends and friends. She does this because she is very susceptible to peer pressure. Ideally, she needs to boost her confidence and realize that she does not need to impress boys by pretending to be who she isn’t. Deep inside, she wants to be the best Vaylin she can possibly be, to provide her mother some comfort and distraction from the divorce and from dealing with Vaylin’s two brothers and their many perceived issues. This is why she tries her hardest. Vaylin dreams of being successful and moving somewhere warm, like California, where she can enjoy the sun all year around.



### 3. Jasper



Jasper is also 13, and he is Kanye and Vaylin's brother. He does reasonably well in school; his grades are Bs and As. He is an auditory and visual learner with great creativity. According to Piaget's developmental stages, he is in period IV of development, as like Vaylin, he is able to think systematically regarding abstract ideas; however,

in some ways he is still struggling through stages II and III; he has egocentric tendencies and still talks to his favourite stuffed monkey on a regular basis.

Physically, Jasper seems like a regular teen on all accounts, but in reality, he has a few health issues; he is allergic to contact water, and blisters if he is exposed to rain. He is actually allergic to many things he comes in contact with, and his room has to be washed with vinegar water once a week. He is also severely asthmatic, requiring constant care and medicine; up to his tenth birthday, Jasper was short for his age and extremely thin, with bones jutting out from everywhere, and a skin that was so white, it was almost transparent. Sometimes, the movements of his organs were visible. He simply could not eat much, as he ended up getting sick and being unable to breathe, and started not eating as a defense mechanism. After his tenth birthday, the doctor tried a new, stronger medicine which improved his condition considerably. He gained weight and started having more energy.

However, seems like he has inherited some of his father's psychological issues. Jasper has bouts of anger and depression, and is known to say some intentionally hurtful things to friends and family; he rarely compliments. He is prone to tantrums, even though he should have outgrown this tendency. Jasper normally overreacts about things and is a "cup half empty" sort of person. Perhaps because of his health issues, or perhaps because he tends to throw tantrums and say unkind things, he has only one friend; a stark contrast to his brother's entourage. Jasper tends to try and befriend his brother's friends, playing videogames with them.

Jasper's favourite thing to do is making movies. He has a video camera and takes it everywhere. His movies are rich in special effects which he achieves by creative editing and by building contraptions and props to add a touch of realism, usually towards violence. While he can be sweet at times, he can flip in an instant, and seems obsessed with blood and death.

Deep inside, he worries if he will have a normal life. He sees a lot of his disabled father in him, and that scares him. He thinks from all his siblings, he picked the shortest stick; not only he has to deal with a collection of health issues, he also has his father's mercurial temperament and inability to say kind things to others. Jasper is so fully aware of this, he won't allow anyone to compare him to his father, ever. In general, he has difficulty controlling his negative emotions and his anger towards his parents, his siblings and his lot in life.

## Vital Information

**Author:** Angela Jurgensen, Cube Director of Section 17

**Subject:** Science

**Topic of unit of study:** Cell reproduction

**Grade level:** 9<sup>th</sup> grade

**IRPs:** B1. Explain the process of cell division

**PLO:** Distinguish Meiosis from Mitosis in terms of outcomes (i.e., number of chromosomes and number of daughter cells)

## Objective and background

The three students' consciousness were taken from the year 2000 while they were sleeping, and brought to the future to participate in an experiment called **Night School**. This experiment, reaching thousands of children and youth worldwide, focuses on the ones who are struggling in life, but show great potential to change the world, if they learn to focus their energies towards the right activity. These chosen students often have lost their childhood, lost hope in the future, or are just lost.

The students have their consciousness removed while they are asleep and taken to a state-of-the-art facility with several different modules designed for learning at just the right pace. There are outdoor scenes that include period scenes, fantasy lands and fields, but also indoor scenes, where the learning is more obvious and directed. For these three particular students, the method chosen to guide them was an observational cube. There are cubes of all sizes, designed for single students up to a group of fifty students.

In the cube, the children are simply told they will learn a certain school concept, and will be exposed to this concept in six different ways. The cube proceeds to help them by not only teaching the subject, but also helping them find their way in life and who they truly are, through self-exploration. Following the Montessori method, the cube concept is, if it is not working, don't force it; that is, if the student decides not to interact, it is his choice not to do so. In this, the cube differs from regular school. Because the cube offers six different opportunities for the child to learn, then the child is given the option to abstain from a certain activity if he or she wants to. However, one of the prerogatives for leaving the cube is passing a final written test with at least

70% correct answers; if the student does not pass, then this student has to repeat the whole process, starting with the first activity. Their consciousness stays in the cube until they are ready to return.

This particular cube-shaped environment was designed for three students; each side is sixteen square feet. It has six inner facing computer screens, five of which can easily open, in effect serving as doors for the cube. The bottom side of the cube does not open; it is currently outfitted with three red sitting beanbags, three chairs around a circular school table outfitted with a touch screen surface and a laser printer, and a small caddy with various school supplies. Its sterile interior is bathed in a warm light that seems to be coming from the walls.

The purported objective of this Night school experiment is to introduce the students to the subject of cell division – Meiosis and Mitosis and how a cell replicates, as well as understanding the DNA strand and the basic concept of genes. This will be done via six completely different methods focusing on different learning styles, ensuring that in the end, all three students have an equal grasp of the subject matter.

## Summary

Students were taught the subject of Mitosis through six different methods.

- A lecture with slideshow presentation.
- A poster-building activity
- Jigsaw Mitosis
- Building a meiosis rap
- Mitosis “reenactment” with construction set and rope
- Kids watch a youtube videos on Mitosis, and finish the final test.

After these six activities, the students were able to pass the first time around. Every one of them felt very successful during at least one of the activities.

## Implementation

### Activity 1. Cell Reproduction – A Lecture and slideshow.

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#### Learning context

Kanye, Jasper and Vaylin are in the room together, sitting around the blank desk which is currently blinking. The lecturer, Avicenna, is almost ready to start. He is passionate about Science; he has a loving and patient demeanor, and believes in questioning students throughout his lecture time. He appears to the students on the table surface, introduces himself and explains to the students the subject they will be learning, before he starts his lecture. He asks what the students know about Mitosis and Meiosis, as a way to assess what is their understanding of the subject; Vaylin raises her hand and explains that they have not learned about that subject yet.

When he introduces himself, Vaylin and Kanye like him immediately; Kanye comments, “Oh good, you’re not a cracker!” while Vaylin giggles and shushes Kanye. Jasper is unsure; he does not know if he can trust this man with a strange accent, but he pays attention at any rate.

Avicenna starts the lecture with a well-organized slideshow and explains the points well, trying to make it as interesting as possible. He constantly engages the students and asks them to participate, to guess, to take a leap. Despite his attempts to engage, this method of teaching is hard for Kanye. As he sits and tries to focus his attention, he eventually starts poking at his brother, then petting him like a cat. He simply does not know what he is supposed to do.

Avicenna asks Kanye to either engage or leave the circle. Vaylin seems to be enjoying the lecture, and asks Kanye to please stop; Jasper tolerates his brother, but Vaylin is getting visibly distressed and upset; she tries to focus and interact with Avicenna. Kanye eventually gets up and flops on one of the beanbags, dozing off to sleep before the end of the lecture.

Jasper is fidgeting, but still manages to follow along and answer a few of Avicenna's questions. He picks up some coloured pencils and starts drawing cells along, as Avicenna explains the subject through the slideshow.

## Procedure

Avicenna delivers a half-hour interactive **lecture**. He explains the different phases of meiosis and mitosis, then zooms into the DNA to show how the bases, sugar and phosphate join together to make the DNA; finally, he told students about genes and their role in determining human features. Avicenna follows his lecture by sending to the printer a condensed one-sheet page, with bullet points of all the important facts. These sheets are missing parts of the text. Vaylin and Jasper are instructed to find a binder with their names on it in the caddy, and bring it to the table; they place the sheet there. Avicenna reads through the bullet points as the students read along. Some parts of the text are missing, and Vaylin and Jasper **fill the text in**. In the end, Avicenna asks Vaylin to **teach** Jasper about Mitosis; then he asks Jasper to teach Vaylin about Meiosis.

This type of activity set is reminiscent of Locke's original idea that a child is a blank slate in which to write new knowledge, but with a twist in that the child has to complete the missing spaces and come up with their own answers; in that sense, this constructivist approach reminds us of Piaget's theories.



## Collaboration

Vaylin and Jasper taught each other as a segment of the lesson.

**Time allotment:** 60 minutes.

## Author's Comments & Reflections

By the end of the activity, Kanye is asleep. Both Vaylin and Jasper are tired, but have understood some of the major concepts given. Vaylin in particular enjoyed the class, and also enjoyed the opportunity to teach her brother. Jasper did not do too well during the segment in which he was supposed to teach Vaylin; he was tense, hurried through, and didn't seem to take it seriously. This type of lesson is not ideal for students who are visual learners, and don't seem too work for students who have ADHD; however, making the lecture as interactive as possible still can have an impact if a student is a visual learner (but not ADHD). Other methods of learning are still necessary to supplement a lecture in both cases; considering that between 65% and 80% of the population learns better visually, we see why lectures alone as not very successful reaching the entire classroom.

## Assessment rubric

The assessment of this lesson was done in two ways. First, through the sheets with missing spaces that the students filled in; second, through a rubric which Avicenna worked on while watching the students teaching each other.

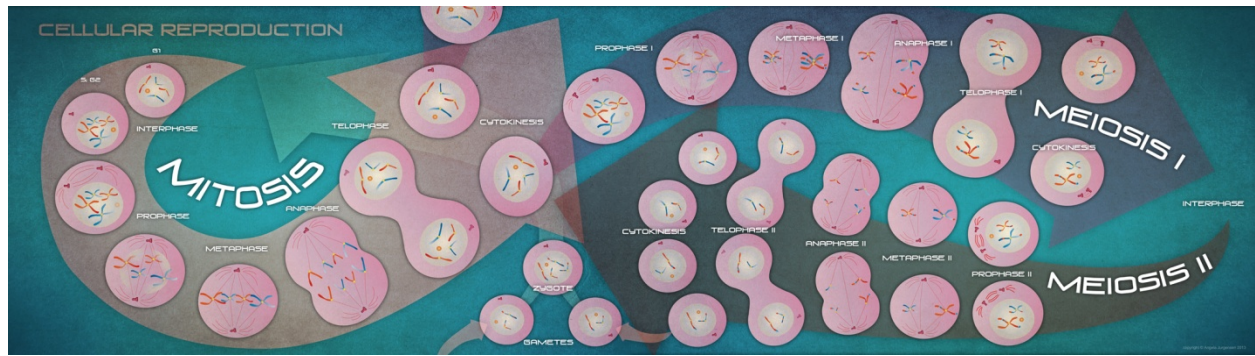
On the Appendix, please find a copy of the rubric, as well as a copy of the assessment sheet with important facts about Mitosis and Meiosis.

## Activity 2. Research and Poster Construction

### Learning context

Vaylin wakes Kanye up after Avicenna's lecture. The monitor on the table top now displays geometrical shapes rhythmically shifting from one to the other. The three siblings sit next to Kanye on the red beanbags, waiting. They are curious to see what will be the next activity. Kanye is cranky after waking up from his short nap and doesn't say much; Vaylin and Jasper, however, wonder what the next activity will be. "Something boring," Kanye says finally, and flicks a booger at his brother, who punches him on the upper arm.

At this point, one of the walls lifts up like a giant garage door, revealing a young man wearing an old-fashioned suit, a long jacket and a hat. He identifies himself as Max Brodel, a german medical illustrator. He is visibly awkward around the children, but lights up when he sees Jasper's drawings of cells on the table. "These are very good! Look at the shading!" he says, and proceeds to show the children his own poster of the Mitosis and Meiosis process. "Everything integrates, you see? It's all a part of the cycle of life." Brodel is so excited about science, the children pay close attention as he describes in his poster how one phase leads to the other, and so on. He expressively moves his arms and follows along, from cell to cell, focusing more on the visual aspect of the process than on the memorization of facts. Kanye makes a "cuckoo" sign with his hand next to his ear, but is also hypnotized by the young, excited artist.



He guides the children through a short independent research session, serving as one more resource when the students had any questions; mostly, the students worked on their own. Kanye started immediately working on the poster as he read about each individual phase, making a huge mistake right from the start, and trying to correct it by ripping out the piece of the poster with the mistake; he asked Brodel for another piece of cardboard, but the teacher says that “in art, you have to work around what you do; these are consequences for your actions.” Kanye responds by being more careful and quiet, and it is clear that while he does not appreciate Brodel’s lack of providing him a new piece of poster paper, he also admires Brodel a great deal. Jasper was careful with his research and did a very good job with his drawings. Vaylin decided to research all the phases and write them down before even starting on the poster. Vaylin was very hard on herself, and got frustrated as she was unable to make the artwork on the posters look as interesting as Brodel’s or her brother’s; Jasper and Kanye had an easier time, although Kanye’s poster was a little disorganized and showed a few spelling mistakes.

By the end of the session, all students are instructed to hang their posters with tape on Brodel’s wall, below his own. Brodel stands back, nods approvingly, and leaves the cube.

## Procedure

Brodel hangs his poster on the wall where he emerged from, and expressively explains the poster for ten minutes, acting out each phase in quick succession. He proceeds to give each child a large piece of board paper, some scissors, crayons, pencils, and other material found on the resource caddy. He brings out a few books about cellular reproduction and instructs the children to make a poster with the different phases of Mitosis and Meiosis; he instructs them not to write much text on it, focusing on the visual representation of each phase instead.

This activity is strongly based on Piaget's and Montessori's theories that a child's true learning comes from individual exploration, that is, the child learns best by doing something themselves with little guidance.

## Collaboration

Little collaboration happened during this segment, as the students mostly worked individually on their posters; however, as the posters were developed, the students were *generally* supportive and kind towards each other's work.

**Time allotment:** 90 minutes.

## Author's Comments & Reflections

All three students were interested in the instructor, which helped gather interest for the subject matter; all students participated in the activity, although it was clear that Kanye had a tougher time taking the task seriously in the beginning. As Vaylin's poster failed to meet her expectations, she finally became exasperated, and said "I suck! I suck" to which Jasper responded with a cackle and whooping and pointing at her poster, then taking her poster and dancing around the room. "These look like sunny side up eggs, with ants crawling on them! HA HA HA"

Kanye intervenes, saying "it's not that bad, Jasper don't be so mean". Brodel interrupts the scene and asks Jasper why does he behave this way towards others – *why* does he try to make others feel bad. Something about the way he is asked the question seems to shock Jasper; no one has ever asked him the question before, and he becomes introspective and quiet. "I don't know, I was just kidding, I don't *really* want to make anyone feel bad."

"Well, then maybe you should think about things before you do them; have you tried pretending you were Vaylin? Think of how she felt when you danced around with her poster." Brodel's method of calmly questioning Jasper seemed to do the trick; Jasper looked down, and tears were coming to his eyes. "I am sorry, Vaylin. I didn't mean to make you feel bad about your work and embarrassed and sad." He hands the poster back to Vaylin, who smiles, saying "It's OK, Jasper."

Besides the incident, the activity was successful for every student involved.

## Assessment rubric

The assessment of this lesson was done by the final presentation of the poster to the teacher. In the Appendix, please find the rubric for the poster and a copy of one of the posters.

## Activity 3. Jigsaw Mitosis

### Learning context

The students are waiting for the next teaching module. Kanye starts running around the room, flapping his arms, just as the wall opposite to Brodel's wall starts to open up. A young teacher in a dark dress comes into the room, and introduces herself as Cornelia Clapp. She is warm and kind, and smiles as she touches the children's hairs and leans forward while talking to them. She immediately wins the children over. Mrs. Clapp explains that her favourite subject is Marine Biology; "Maybe you will be back here some day and I can share more about it with you?" The subject she will be teaching, however, is still Meiosis and Mitosis, and this time, the activity is a jigsaw one explaining Mitosis. The children participate on this activity politely enough, although Kanye needs to run a few laps and squeal like a pig before he can join the others and read about the subject; he never sits down, however. When the jigsaw is finally put back together, the children explain their portion with success. Kanye does well, but he never sits down for the whole term, not even to write down the portions explained by his siblings. The last phase of Mitosis is explained by Clapp, who proceeds telling the students the similarities between Mitosis and Meiosis. She gives students empty sheets for Meiosis, and asks them to try and fill in the blanks themselves. Lecturing is kept short and she manages to keep the three students interested.



## Procedure

Cornelia Clapp starts off by giving each student one sheet with empty spaces for every phase of mitosis. One of the phases is filled in already. They read the explanation of the phase, studying it individually. Then, the three students are asked to share what they have learned, in the correct order. As each student tells the others what they have learned, the other two students fill in the blank space on the sheet. Clapp proceeds to tell them about the last phase of mitosis. She gives them a second sheet with empty spaces, this time about meiosis, and the students try to fill it in themselves. In the end, the students are invited to participate on a game of Jeopardy, which serves as assessment of their abilities so far. The winner of the game is given an extra credit towards their final exam. They are instructed to put their filled sheet in the binder. This type of activity set is based on Bandura's ideas that learning can come easily through observation of other's thought processes. In a way, Bandura was referring to modeling in a more general sense, in that we model the behavior we see in others, but in this case, the principle can be stretched to cover this type of activity as well. Piaget's ideas also would fit into this activity well.

## Collaboration

The three students must work together to complete the first sheet. During the completion of the second sheet, collaboration is encouraged.

**Time allotment:** 30 minutes for the Jigsaw activity; 60 minutes for the Jeopardy game.

## Author's Comments & Reflections

The students seemed to be able to complete the task, despite the fact that Kanye was unable to sit down. During the Jeopardy game, he became particularly excited and jumping around a great deal. Vaylin was the winner of the game, and thus has an extra credit which is put towards her final exam. Seems like this kind of activity is not ideal for students with ADHD and kinesthetic learning, but despite this, Kanye still managed to complete it, probably because of the level of interaction with his siblings, which helped him get into the activity as if it was a game.

## Assessment rubric

The assessment of this lesson was done through the jeopardy game.

On the Appendix, please find a snapshot of the jeopardy game, which is easily constructed through Powerpoint.

## Activity 4. The Mitosis Rap

### Learning context

Kanye starts piling up the beanbags and trying to reach the ceiling. He then puts all three bean bags together and starts flopping on them over and over. Vaylin and Jasper find that to be a very good idea, and start doing the same thing. Kanye finally lands wrong and hits Vaylin with his elbow, which makes her cry and retreat to a corner. Both Kanye and Jasper go to their sister; Jasper starts mocking her, but stops and just asks if she is ok. Kanye is making baby voices and trying to soothe his sister by talking through his armpit. In the middle of this commotion, the room opens up and a rope falls down from a small hole.

Music starts playing, and the lights start blinking in the room in rhythm with the music. Kanye stops, turns around and yells, “HEY this is Tupac’s “Me against the world!!!!” He starts singing along, just as someone slides down the rope.

“TUPAC!” Kanye is in shock. He loves music, and has listened to all of Tupac’s work. “I thought you were dead!”

“Hey kid, death is just another trip...”Tupac’s charisma immediately gets the children attention, and he starts his lesson by explaining how there are more than one ways of learning something; he plays a video on Youtube on the center table, a hip-hop song about Mitosis.

## Procedure

Tupac greets the children and, after initial introductions, plays the video with the Mitosis hip hop song, <http://www.youtube.com/watch?v=IlV9hExXZnM> ; he then instructs the children to choose a song and write their own version of the song, this time about meiosis. He gives the children small pointers regarding rhythm and pacing, and is very supportive, even when Vaylin leaves the group. In the end, each sibling has to sing their version of the song. The whole activity lasts ninety minutes. Tupac says goodbye, ties the rope to his waist, tugs on it twice and disappears through the ceiling. In this activity, the influence of Vygotsky's ideas of social interaction guiding cognitive development are clear; the children strive to make a good rap music in the hopes of sharing it with their peers, bringing this interaction to centre stage. It also displays clear hints of Howard Gardner's theory of multiple intelligences; music would be one kind of intelligence found on human beings, and Kanye displays a high level of musical intelligence, with great pitch, rhythm and ability to compose music easily.

## Collaboration

The three students have to sing their song to each other. They try helping each other with rhymes and on how to make the song work. In the end, only two students complete the task.

**Time allotment:** 90 minutes.

## Author's Comments & Reflections

Kanye does extremely well. It turns out he has an amazing sense of rhythm and rhyme; he has no problem completing the song, and when he sings his version of the song to the group, everyone is very impressed with his voice. Jasper tries to follow his brother's footsteps, and does very well with his song as well; he asks for a camcorder and Tupac lends him his cell phone. Jasper records a video of Kanye's performance. Vaylin had a difficult time with this activity, for several reasons. She does not like activities without a specific set of rules. She also was not comfortable singing in front of the group, and was not able to complete the song. Finally, her creative writing skills which are usually not very strong, made the activity even more difficult. She can't come up with rhymes, gives up about thirty minutes into the activity and retreats to a corner of the room with some paper and a pencil; she spends the remaining time of the lesson drawing pictures of purses. Kanye and Jasper are excited after the rap activity. Vaylin, too, seems happy, despite the fact that she does not like to fail; seeing both her brothers so happy and excited made her happy too, and she loved watching the performances. It was an interesting activity to watch, and very chaotic; it's amazing to see something so unstructured come together in the end, with such positive results.

## Assessment rubric

The assessment of this lesson was the finished rap song.

## Activity 5. Mitosis in 3-D

### Learning context

The third wall opens, and an older, happy man comes into the room. He introduces himself as Theodor Geisel, and brings some strange equipment with him. The siblings find the name somewhat familiar, but don't know where they heard it from; still, they are intrigued by the bundle of ropes and oddly shaped packages. "How are we supposed to learn Biology with jumping ropes?" asks Kanye. Vaylin starts unravelling the package which Geisel placed on the table, and notes, "Hey, these kind of look like chromosomes splitting..."

### Procedure

Geisel plays the video [http://www.youtube.com/watch?v=S3huI50R\\_p8](http://www.youtube.com/watch?v=S3huI50R_p8) on the light table. He places the bundle of ropes and shapes on the table. The children are instructed to use the ropes to form a cell on the floor, and place the shapes in the centre as chromosomes. After this, they are instructed to use the ropes to move the chromosomes to the edges, and move the ropes to split the cell, in effect acting out the mitosis process with the help of the giant model. The students are asked to repeat the process by themselves. They are then asked to repeat the same activity, but this time display what would be the procedure if this was a cell during Meiosis. In the end of the

activity, students are given a crossword puzzle about Mitosis. In this activity, Vygotsky's ideas of social interaction guiding cognitive development also become important; the interaction between the children is not only good, but necessary for them to learn the given topic.

## Collaboration

This activity relies heavily in collaboration; all three students must engage for a successful cell division to take place. They must run around together and do things in the proper sequence, and at the proper time; each one takes on a role, and the role has to be followed properly for it to make sense.

**Time allotment:** 90 minutes.

## Author's Comments & Reflections

All three students get very involved in this activity, but not exactly in a positive way; at least, not immediately. While Vaylin tried to bring order to the process, Kanye gets one of the ropes and tries to tie both of his siblings together. Jasper grabs another rope and tries to strangle Kanye, who yells at him to stop; "I was just joking!" Jasper sulks and finally joins his sister, who is trying to follow Geisel's instructions and setting up a cell in interphase. Kanye finally joins the other two, and despite the fact that he is interacting and participating on the activity, he still

remains distracted by the unusual method of teaching. Something becomes obvious regarding kanye: he seems to have grasped the content quite well, and is perhaps bored with the repetition. He does not care much about the names of each phase, however, just about what happens in general; *this may be a problem for him later on, when he takes the final test.*

### Assessment rubric

The assessment of this lesson was the crossword puzzle about mitosis. Please find the crossword puzzle on the Appendix.



## Activity 6. Mitosis Video and Final Test

### Learning context

As the children settle down, another wall opens, and a strange, curly haired lady comes in; she seems vaguely familiar, but the children can't place her. "My name is Mrs. J; I am the program Director, and am here to administer the final test." She guides the children around the table. They all follow her, feeling instinctively warm towards the unknown woman. Mrs. J smiles and plays a video on the display table. She administers the test, touching the children's hair, peeking over their shoulders and patting their backs as they work. Finally, she hugs each one of them and leaves the room quietly. The room dims, blinking blue and purple lights in a certain rhythm which has almost a hypnotizing effect; Mrs. J's voice rings from the table. "You have all passed, my lovelies... now, off you go, back to your time. You may not remember all that you have learned today about science, but you will certainly remember all that you have learned about yourselves here today."

### Procedure

Mrs. J. plays the video [http://www.youtube.com/watch?v=AhgRhXl7w\\_g](http://www.youtube.com/watch?v=AhgRhXl7w_g) and the children listen to it attentively; it is a short video. After the video, the children are given access to the online test, and 60 minutes to complete it. The teacher circulates and observes their progress. Questions are no longer answered. This final activity is reminiscent of Kohlberg's stages of moral

development; the idea of a final test brings the need to have a good moral base, remain honest and not try to copy other people's answers.

## Collaboration

No collaboration is allowed.

**Time allotment:** 65 minutes.

## Author's Comments & Reflections

All students worked on the test, and all three were done with the test before time was up. Kanye, however, tried to cheat on the test by asking his sister for a couple answers regarding the phases of Mitosis; Mrs. J. was expecting it, however, and reminded Kanye that there is no honor in copying his sister's answers, and that he should trust his own abilities for this activity. This seems enough to bring his attention back to the final test.

## Assessment rubric

The assessment of this lesson was the final test. A link to the test is in the Appendix.

## Conclusion

One year after the experiment, the students, now fourteen, have a better sense of who they are in life. Vaylin has decided to go into Biology and following a scientific career. She is now planning on moving to California for college. Kanye has joined his highschool choir, and is now the second best base in the state of Oregon. He is elated; he finally has a purpose in life, and will be going to University for a Music degree.

Jasper continues to make films, but has a much better outlook in life. He joined choir after his brother, and is enjoying music a great deal. For the future, Jasper is currently divided between music or film.

Nightschool has not only helped the students learn the subject matter, but also has taught them something deeper. Through these activities and interactions, they have found their purpose and true self.

This fictional experiment displays a reality that we often forget about a high school classroom. A multifaceted approach is the only way to ensure that the whole classroom learns not only about the subject, but most importantly, about their own strengths and where their passions lie. The traditional methods of teaching were unable to bring out the best on everyone; without exploring different activities, students may never think of venturing out of their comfort zone, and most of the times, that is exactly where a person should go looking for answers.

## Appendix

### Activity 1. Lecture

Teacher Name: Avicenna

Student Name: \_\_\_\_\_

CATEGORY	4	3	2	1
Content	Shows a full understanding of the topic.	Shows a good understanding of the topic.	Shows a good understanding of parts of the topic.	Does not seem to understand the topic very well.
Speaks Clearly	Speaks clearly and distinctly all (100-95%) the time, and mispronounces no words.	Speaks clearly and distinctly all (100-95%) the time, but mispronounces one word.	Speaks clearly and distinctly most (94-85%) of the time. Mispronounces no more than one word.	Often mumbles or can not be understood OR mispronounces more than one word.
Collaboration with Peers	Almost always listens to, shares with, and supports the efforts of others in the group.	Usually listens to, shares with, and supports the efforts of others in the group.	Often listens to, shares with, and supports the efforts of others.	Rarely listens to, shares with, and supports the efforts of others in the group.
Enthusiasm	Facial expressions and body language generate a strong interest and enthusiasm about the	Facial expressions and body language sometimes generate a strong interest and enthusiasm about the	Facial expressions and body language are used to try to generate enthusiasm, but seem somewhat	Very little use of facial expressions or body language. Did not generate much interest in topic being
Listens to Other Presentations	Listens intently. Does not make distracting noises or movements.	Listens intently but has one distracting noise or movement.	Sometimes does not appear to be listening but is not distracting.	Sometimes does not appear to be listening and has distracting noises or movements.

Name \_\_\_\_\_

Date \_\_\_\_\_

## Meiosis Review

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Fill in the blank with the appropriate letter

a. Somatic	b. Fertilization	c. Egg	d. Diploid
e. Sperm	f. 46	g. Haploid	h. 23
i. Homologous Chromosomes	j. Zygote	k. Meiosis	l. 2

1. The female gamete is called \_\_\_\_\_
2. The male gamete is called \_\_\_\_\_
3. Non-sexual cells are called \_\_\_\_\_ cells
4. A human somatic cell has \_\_\_\_\_ chromosomes in its nucleus.
5. A somatic cell is a \_\_\_\_\_ cell.
6. A diploid cell has 2 copies of each chromosome, which is called \_\_\_\_\_.
7. Gametes are \_\_\_\_\_ cells.
8. Both sperm and eggs cells have \_\_\_\_\_ chromosomes inside there nuclei.
9. The process of combining and egg cell and a sperm cell is called \_\_\_\_\_.
10. What kind of cell is formed after fertilization \_\_\_\_\_.
11. Gametes have a special type of reproduction called \_\_\_\_\_.
12. How many divisions does meiosis go through? \_\_\_\_\_.

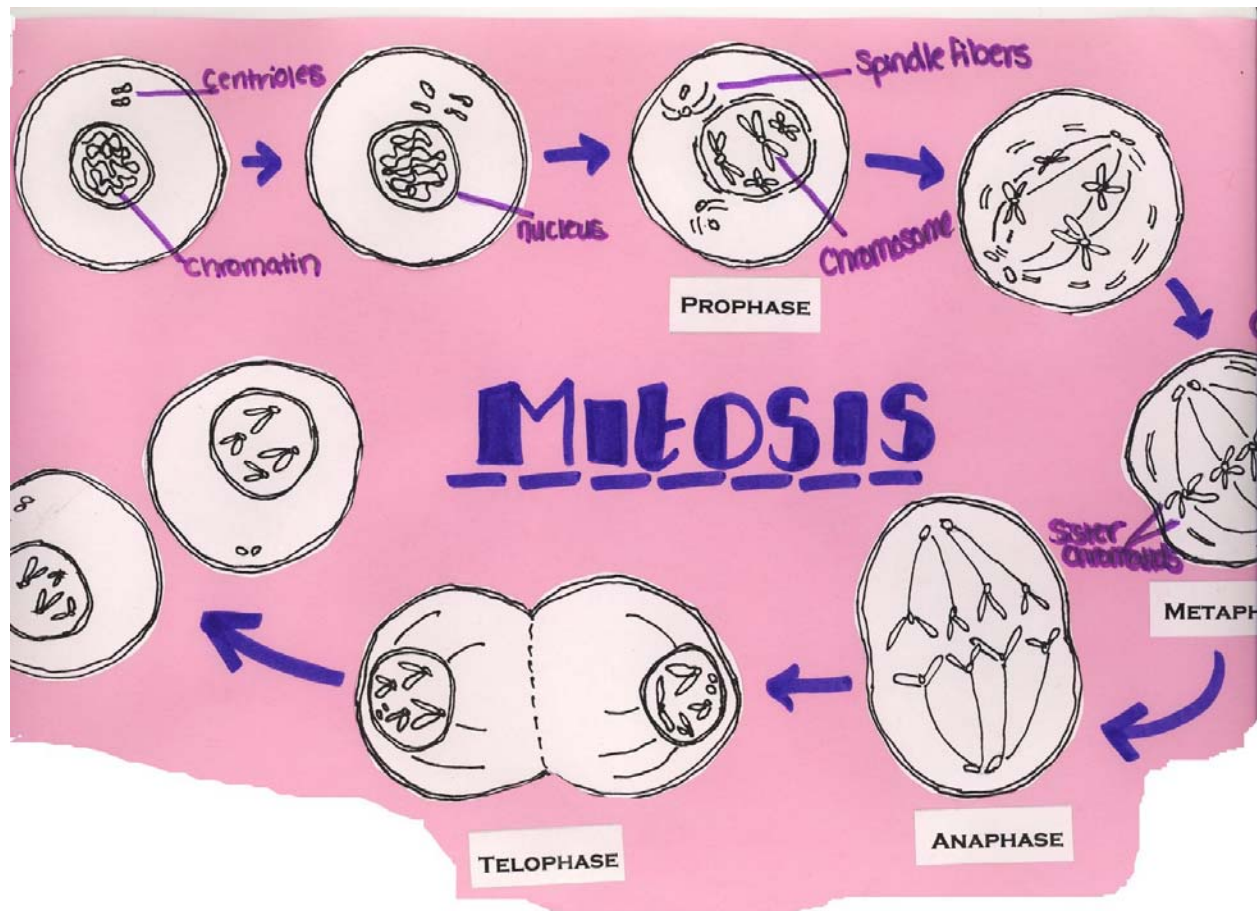
## Activity 2. Research and Poster

### Making A Poster : Mitosis and Meiosis

Teacher Name: **Mr. Brodel**

Student Name: \_\_\_\_\_

CATEGORY	4	3	2	1
Attractiveness	The poster is exceptionally attractive in terms of design, layout, and neatness.	The poster is attractive in terms of design, layout and neatness.	The poster is acceptably attractive though it may be a bit messy.	The poster is distractingly messy or very poorly designed. It is not attractive.
Graphics - Originality	Several of the graphics used on the poster reflect a exceptional degree of student creativity in	One or two of the graphics used on the poster reflect student creativity in their creation and/or	The graphics are made by the student, but are based on the designs or ideas of others.	No graphics made by the student are included.
Graphics - Relevance	All graphics are related to the topic and make it easier to understand. All borrowed graphics	All graphics are related to the topic and most make it easier to understand. All borrowed graphics	All graphics relate to the topic. Most borrowed graphics have a source citation.	Graphics do not relate to the topic OR several borrowed graphics do not have a source citation.
Labels	All items of importance on the poster are clearly labeled with labels that can be read from	Almost all items of importance on the poster are clearly labeled with labels that can be read from	Several items of importance on the poster are clearly labeled with labels that can be read from	Labels are too small to view OR no important items were labeled.
Content - Accuracy	At least 7 accurate facts are displayed on the poster.	5-6 accurate facts are displayed on the poster.	3-4 accurate facts are displayed on the poster.	Less than 3 accurate facts are displayed on the poster.





### Activity 3. Jigsaw Mitosis

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Prophase	Anaphase	Metaphase	<u>Telophase</u>	Bag of Tricks
10	10	10	10	10
20	20	20	20	20
30	30	30	30	30
40	40	40	40	40
50	50	50	50	50

### Activity 6. Mitosis Video and Final Test

<http://www.sciencegeek.net/Biology/review/U3Review.htm>



## Bibliography

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