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ALLOTMENTS AND ARITHMETIC: LAND DISPOSSESSION IN INDIAN BOARDING SCHOOL MATHEMATICS CURRICULA, 1879-1932

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Abstract: This paper uses Holm's (2005) framework of the three phases of colonialism to analyze mathematical word problems in the Estelle Reel Papers. Our main findings reveal that the mathematics instruction in Indian boarding schools reflected the tactics used across the three phases. Analysis of the social and political content embedded in these word problems also indicates a connection to the idea that teaching private property ownership would force Indigenous people to abandon their cultural heritage, develop a sense of individualism, and empower a sense of freedom in the owner. This idea of private property ownership is antithetical to the views of many Indigenous peoples, who draw a deep connections to life through land and the environment (Sepulveda, 2018).

Objective/Purpose

This study is part of a larger project examining federal policies of cultural assimilation and mathematical content taught in Indian boarding schools during the early 1900s (Gutiérrez et al., 2021). This paper focuses on mathematics problems referring to land and how these characterizations are antithetical to many Indigenous views. The aim of this paper is to show how assimilation practices embedded in the mathematics problems in the Estelle Reel Papers were used to reconstruct the way Indigenous people viewed land.

Perspective/Theoretical Framework

This project works to fill the gaps in Indigenous histories pertaining to mathematics in Indian boarding schools that have not been explored. Utilizing a critical analysis, we highlight how the math curriculum was used to assimilate Indigenous students by attempting to strip their sacred relationships to and understandings of land. Theoretically, this paper draws on the work of Indigenous and anti-colonial scholars—Holm (2005), Ornelas (2007), Sepulveda (2018), and Tuck & Yang (2012) to interpret math word problems as instances of internalized colonization.

Phases of Colonialism

Holm's three phases of colonialism are a reflection of the Indian-White relationship (Holm, 2005). Holm breaks down these phases into three steps, each building off the previous.

Phase 1 – Disruption and Boundary Making: The first of this phase is the disruption and displacement of Indigenous peoples. Holm describes this as the start of a conflict between the Indigenous people and colonizers. This process typically leads to an agreement that is meant

to set territorial boundaries and maintain order (Holm, 2005). However, since the goal of the colonizer is to acquire land, these agreements with Indigenous communities (treaties) are often broken, resulting in more violence and disorder (Holm, 2005).

Phase 2 – Forced Assimilation: The second of these phases involves the attempts to integrate Indigenous people into a colonial socioeconomic structure (Holm, 2005). Here, assimilation through forced labor or teaching Indigenous people to speak the colonizer's language is used (Holm, 2005).

Phase 3 – Internalized Colonialism: Finally, following Albert Memmi, the final phase of colonialism is internalization (Holm, 2005).

Indian boarding schools were created in the late 1800s, around the same time the Dawes General Allotment Act was passed in 1887. The Dawes Act dispossessed Native people of over 90 million acres of land and allowed the government to assign land allotments to Native families. This idea of land dispossession followed into the education system in Indian boarding schools, which is visible in the mathematics problems. In this way, the U.S. integrated assimilation into the education system by teaching students about private ownership and inculcating them with those values.

Anti-Colonial Perspectives on Land

Within Native perspectives, the importance of land is seen as a human rights issue (Ornelas, 2007), where humans have a sacred responsibility to care for their Mother Earth (Sepulveda, 2018). This view of land embeds a spiritual understanding that interconnects culture, spirituality, and religious difference (Ornelas, 2007). This perception of land is antithetical to Euro-Western Christian worldviews, which put a strain on the policies made to support and protect lands (Ornelas, 2007). Additionally, Sepulveda (2018) links settler conceptions of land as akin to their beliefs about Indigenous people: uncivilized and ready for domestication (Sepulveda, 2018). Settlers transform land into property through the process of settler colonialism and restrict relationships to land strictly as property owners (Tuck & Yang, 2012).

These views on land play an integral part in analyzing the mathematics problems in the Estelle Reel Papers as a form of colonial curriculum. In Indian boarding schools, Native relationships to land were transformed into the settlers' way of thinking, and the idea of land ownership was prevalent in the mathematics education taught in Indian boarding schools.

Methods and Data Sources

As a part of a larger, ongoing project, this paper focuses on the land aspects related to the math word problems used in the colonial curriculum in Indian boarding schools. The original project (Gutiérrez et. al, 2021) set out to investigate assimilation practices in mathematics curricula in Indian Boarding Schools. During the data collection phase, the research team discovered mathematics word problems in the Estelle Reel Papers, which is a well-known collection among historians of the Indian boarding school system. These primary materials consist of arithmetic problems that were presumably created by teachers and pupils and submitted to Estelle Reel, who was the superintendent of Indian schools between 1898-1910. These word problems were meant to showcase the mathematics instruction that young Native students were receiving. The math problems reflected in this paper come from a subset of the

data: problems aimed at teaching first through eighth-grade students. To launch our analysis, we transcribed the word problems to develop code books and a database. Specifically, word problems pulled from the database involved terms such as allotments, land, cultivation, and fencing. Upon further evaluation, various themes emerged (Saldaña, 2016) from these word problems that were consistent with the idea of assimilation.

A preliminary draft of emerging codes can be found in Appendix A. The code book presents common themes emerging from the mathematics problems and draw out ideas for other research foci. The transcriptions we have made will be used to develop a statistical analysis of the mathematics problems in the future. For now, this paper presents a qualitative analysis of some of the major themes that have emerged thus far. We qualitatively analyze word problems focused on relations to land and how they were used to colonize Indigenous students' relationship to land.

Results

By focusing on the math problems that are related to land in the collection, three themes arose. These themes are consistent with Holm's first two phases of colonialism that are ultimately planned to achieve the third and final phase. The first of the themes that were found was the connection to the Dawes Act of 1887. These mathematics problems explicitly involved scenarios where the students were to be 'given' a piece of land. This can be seen in the following problems (Note: all problems cited are from the "Arithmetic" folder in the collection of the Estelle Reel Papers, Northwest Museum of Arts and Culture/Eastern Washington State Historical Society, Spokane, Washington):

> "When you get your allotment [*sic*] of 160 acres and want to fence it, how much will it cost you if it lines in a square, with a four wire fence, putting the posts 1 rod apart; the posts being work 9¢ apiece and the wire 4¢ a rod."
>
> "If you are allotted 160 acres of land and rent half of it for 10¢ per acre, how much money will you receive?"

During this time, land was emphasized as a commodity utilized for profit in white American views instead of land as ancestor. For example, in the 1916 Annual Report, Indigenous people who received allotments were urged to use them to make a home and "work the lands" (Sells, 1916, p. 30).

These ideals give way to the second prominent theme: modifying land for its 'betterment'. These word problems convey the idea that land itself was not sufficient and needed to be utilized for farming or profit-making.

> "The farm detail at the White Earth boarding school cleared a tract of land for cultivation of the following dimensions: Length 251.6 ft., width 185 ft. What part or parts of an acre does the cleared tract add to the school farm?"
>
> "I have 45 acres of land. Clearing off sage brush costs $2 per acre; leveling cost $1. per acre; plowing $2 per acre; water 25¢ per acre; seed 1-1/2 bu. per acre at 85¢; seeding per acre $1 and harvesting $2 per acre. What did it cost me to plant and harvest my wheat? The yield was 15 bu. per acre, at 85¢ per acre. What did I sell it for? What did I gain?"

These problems clearly demonstrate the idea of land modification for cultivation. This aligns with the notion that white settlers' interests were to transform the lands to use for their needs (Sepulveda, 2018) since their identities come from making 'productive' use of the land (Tuck & Yang, 2012). However, in the first problem, it is also important to note that the question asks how many acres will "add" to the school farm, creating the concept of land ownership. Rather than stating the question as "how many acres will the cleared tract create," the word problem creates the notion that the cleared land *has* to belong to an owner. The second problem also incorporates this idea. Rather than stating a piece of land is "45 acres," the problem explicitly mentions that it belongs to *me* (the reader), where both problems further pursue Tuck & Yang's argument that settler colonialism transforms land into property and that human relations to land are as its owner (Tuck & Yang, 2012).

This leads to the last theme: land as private property. These mathematics problems incorporated the use of land as one's property ownership by 1) creating an enclosure around the section of land to signify private property and prevent accessibility, and 2) through land purchasing. This can be seen in the following:

> "How many rods of wire will it take to make a 3-wire fence around a field a mile square?"
>
> "If I receive $35. a month and spend $20. a month, how long will it take to buy 20 acres at $40. an acre?"

The top problem involves the use of private property by creating an enclosure to show ownership. The second word problem involves labeling land as a currency to be purchased. Here, the idea of having *worth* emerges. Notions of monetary worth also appear in other word problems, which we examine more closely in another study focused on gendered wages and labor (Kim et al., 2022). Overall, the notion of worth highlights that Western ways of thinking involved the constant need to value an object. This need to value land was familiar to white settlers since they viewed land as a source of capital and were convinced "wild land" was made for their benefit (Tuck & Yang, 2012).

Scholarly Significance

These problems highlight the math education that attempted to strip the sacred relationship that Indigenous students had to land. However, it is important to note that this idea was not only taught in the word problems. Severing sacred relations to land was accomplished in other areas of the school day, went beyond the math curriculum, and continued after Estelle Reel's time as superintendent.

For this paper, we focus on the vocational division where students, seventh through tenth grade, began their studies in agriculture and homemaking (Sells, 1916). In the 1916 Annual Report (Sells, 1916), courses of study were developed to teach students in Indian boarding schools called the vocational division (see Appendix B for images of the Outlined Courses of Study). Here, students had courses in "Industrial Geography and Agricultural Botany" (seventh grade), "Vocational Arithmetic and Farm and Household Accounts," and "Soils and Soil Fertility" (eighth grade). These types of courses continued into their final year, where classes like "Rural Economics, and Insects and Insecticides" and "Field Crops and Plant Diseases" were implemented as a course of study. In addition, students were to have 4 hours of "Industrial

Work" where they would apply their lessons from these classes. These lessons were introduced and experimented with in all U.S. Indian boarding schools in 1916 before it was to be permanently published (Sells, 1916). Given this, the course of study further shows that the true lesson in Indian boarding schools was to teach students about vocational work as a way to strip their sacred relations to land and redirect their loyalties to the colonial system (Holm, 2005).

The significance of this work is to fill an incomplete history of Indigenous peoples and Indian boarding schools. At the same time, the hope is that this paper highlights implications for teacher education by challenging educators to reexamine their positions in the classroom, the areas we live in, and the time we live in. From a distance, these math word problems might not appear to involve cultural assimilation, but by deconstructing the math word problems and analyzing the time, space, and people they were written for, it is clear they did. This work further challenges the idea that math is objective by showing that mathematics education can be a weapon for assimilation (Bishop, 1990; D'Ambrosio, 1985).

Bibliography

Bishop, A. (1990). Western mathematics: The secret weapon of cultural imperialism. *Race & Class*, *32*(2), 51–65.

D'Ambrosio, U. (1985). Ethnomathematics and its place in the history and pedagogy of mathematics. *For the Learning of Mathematics*, *5*(1), 44–48.

Gutiérrez, J. F., Sepulveda, C. A., Vaughn, K. N., & Benally, C. (2021). Signs of power and dominance: Mathematics curricula in Indian boarding schools, 1879-1932. In D. Kollosche (Ed.), *Exploring new ways to connect: Proceedings of the Eleventh International Mathematics Education and Society Conference* (Vol. 1, pp. 172–175). Tredition. https://doi.org/10.5281/zenodo.5391989

Holm, T. (2005). *The Great Confusion in Indian Affairs: Native Americans and Whites in the Progressive Era*. University of Texas Press. http://ebookcentral.proquest.com/lib/utah/detail.action?docID=3443087

Kim, L., Smith, M. J., Sepulveda, C. A., Benally, C., Vaughn, K. N., & Gutiérrez, J. F. (2022). *Dividing gender: Domesticity and work in Indian boarding school mathematics curricula, 1879-1932 (manuscript in progress)*.

Ornelas, R. T. (2007). Understanding Sacred Lands. *Great Plains Research*, *17*(2), 165–171.

Saldaña, J. (2016). *The coding manual for qualitative researchers (3rd ed.)*. Sage.

Sells, C. (1916). *Report of the Commissioner of Indian Affairs to the Secretary of the Interior, for the fiscal year ended June 30, 1916*. Government Printing Office.

Sepulveda, C. (2018). Our Sacred Waters: Theorizing Kuuyam as a Decolonial Possibility. *Decolonization: Indigeneity, Education & Society*, *7*(1), 40–58.

Tuck, E., & Yang, K. W. (2012). Decolonization is not a metaphor. *Decolonization: Indigeneity, Education & Society*, *1*(1), Article 1. https://jps.library.utoronto.ca/index.php/des/article/view/18630

Appendix A
Preliminary Draft of Code Book

ARITHMETIC: Refers to mathematics problems involving fundamental operations on numbers to get an answer. Generally, these problems involve statements or expressions consisting of addition, subtraction, division, or multiplication.

  - "How many…"
  - "How much…"
- **ARITHMETIC [summation]:** This subcode is a counting problem that uses simple addition/subtraction problem with one solution.
  - "I had three dozen pencils and gave the class 13. How many were left?"
  - "There were 18 marbles in the box. The boy took 2 marbles. How many marbles were left?"
- **ARITHMETIC [money]:** Simple summing problem that involves American currency (explicitly mentions it).
  - "If you have three dimes and a half dime, how many cents have you?"
  - "How many oranges at 3¢ each can you buy with 10¢?"
- **ARITHMETIC [memorization]:** This subcode requires an answer that is based on a definition, rule, or table that is expected to be memorized.
  - "How many cents in one dime?"
  - "Define the terms of percentage."
  - "What are the dimensions of a roll of paper?"
  - "What is interest?"
- **ARITHMETIC [multiplication]:** This subcode requires problems that often involve a given number that is to be multiplied or divided by another number to achieve a value.
  - "If there are 12000 pieces washed in one week at the laundry, how many pieces will be washed in 16 weeks?"
  - "If Haskell received 780 boxes of shoe blacking, worth 40 cents a dozen boxes, how much did it all cost?"
  - "Reduce 144/216 to lowest terms."
  - "5/8 of 9/20 = ?"
- **ARITHMETIC [percentage]:** This subcode uses ratios or fractions, whose denominator is always 100, in the form of percentages
    - "Twenty-five words were given in the spelling lesson. Charlie was marked 88%. How many words did he misspell?"
    - "If you have $500, and spend 10% of your money usefully, how much have you left?"
    - "A farmer sold 12 cows. This was 20% of all he had. How many had he at first?"

BUSINESS: This code refers to problems that are involved in trades, transactions, or buying/selling using U.S. monetary currency. They often use terms such as: net worth, gain, profit, and value.

- **BUSINESS [value]:** Refers to finding the worth or value of an item.
  - "If ice is worth 45¢ per 100 lbs., find the value of the ice and net worth."
- **BUSINESS [profit]:** Involves the action of selling or buying items with an explicit focus on financial gains—i.e., *profits*.

        - "If a man pays $25 for a cow and sells her for $40, how much does he gain?"
        - "I bought 12-1/2 yards of ribbon at 25¢ a yard, and sold it at a gain for $1.12-1/2, what was the selling price?"

- **BUSINESS [interest]:** Problems are based on investing money and/or calculating values based on interest rates.
    - "Find the simple interest on $500 for 3 yr. 6 mo. at 7%?"
    - "What is the interest of $250.00 at 6% from July 3, 1902 until Feb. 5, 1906?

AGRICULTURE: This code refers to word problems that involve animals, farming, material, and crops.

- **AGRICULTURE [commerce]:** These types of problems involve agriculture that is used for buying and selling.
    - "I raised 18 bushels of turnips but I sold one half of them. How many bushels did I sell? How many had I left?"
    - "A farmer sold 37-1/2% of his crop of 816 bushels of wheat at $1.56 per bushel, and the rest at $1.60 per bushel. How much did he get for his entire crop of wheat?"
- **AGRICULTURE [animal]:** This subcode refers to problems that involve animals and selling/buying them.
    - "I paid $64 for 8 pigs. How much did I pay for each pig?"
    - "If 6 sheep cost $30, how much will 20 sheep cost?"
    - "At 25¢ each, how many chickens will be required to pay for 400 lbs. flour at $3 per cwt.?"
- **AGRICULTURE [material]:** Refers to math problems that involve the use of materials that are found in nature.
    - "How much will a pile of cord wood cost 40 ft. long, 16 ft. wide, 6 ft. high at $4.50 per cord?"
    - "If it requires $6.00 worth of wood to make one carriage, how many carriages can be made for $20.00 worth of wood?"

LAND: This code refers to math problems that involve scenarios that are intended to be familiar to the student in terms of land.

- **LAND [private property]:** These are mathematics problems that involve land ownership.
    - "When you get your alotment [*sic*] of 160 acres and want to fence it, how much will it cost you if it lines in a square, with a four wire fence, putting the posts 1 rod apart; the posts being work 9¢ apiece and the wire 4¢ a rod."
    - "If you are allowed 160 acres of land and rent half of it for 10 cents per acre, how much money will you receive?"
    - "A man has 24 acres of ground; he planted 6 acres in corn and 6 acres in wheat? How many acres of ground did he have left?"
- **LAND [modification]:** Situations that ask the student to "modify" land with materials.
    - "A field is 60 rods long and 40 rods wide; what will it cost to fence it at 15¢ a rod?"

    - "My field is 924 feet long and 338 feet wide. At $4.25 a hundred pounds, what will the wire cost to enclose it with a 3 wire fence?"
- **LAND [rent]:** Builds off of the idea of land as property, but goes further to sell/rent off pieces of the given land to make a profit.
        - "If you are allotted 160 acres of land and rent half of it for 10 cents per acre, how much money will you receive?"
        - "A house that cost $2500.00 was rented for $325.00. If $150.00 was made for repairs, what rate of interest did the owner receive on his money?"

LABOR: This code refers to math problems that involve manual labor to finish a domestic project. These problems often use mixed mathematics to carry out the project involving materials and have gendered associations.

- **LABOR [men]:** This code refers to men who perform manual labor through farming, carpentry work or physical labor.
    - "How many feet of wire will Charlie need to fence a garden 10 rods long by 8 rods wide, if he puts three strings of wire around it?"
    - "Pedro receives one dollar per day for pruning trees on the Gould Ranch, how much will he earn in three weeks?"
    - "If a man can plant 2/5 of his farm in 3 days, how long will it take him to plant all of it?"
    - **LABOR [wage]:** Refers to problems that involve wages or compensation men receive for a type of work.
        - "The labor of a man and team is worth $3/50 per day. How much will it cost a farmer to have an irrigation ditch dug, if it takes 8 days to dig it?"
        - "Willie earned 25 cents Saturday afternoon chopping wood. He bought 2 handkerchiefs for 5 cents each. How much money has he left?"
        - "James carries coal for 3 employers and receives 10 cents a week from each. He also earns 5 cents a week by selling "Saturday Evening Posts". How much does he earn in all in one week?"
        - "Vincente earned $7.58 a week working in the best fields. If his board cost him $8.25 a month, how much money had he at the end of two months."
- **LABOR [women]:** This code involves women who are creating domestic products or household work as labor.
    - **LABOR [cultural referencing]:** This subcode refers to math problems that make references to Indigenous arts/craftwork to sell and profit from.
        - "If Mary makes two beaded belts in ten days, and sells them for $2.50 each. How much did she earn per day?"
        - "Mary sold an Indian basket for $2.40 which was 10% more than it cost her. What was the cost?"
    - **LABOR [material]:** This subcode involves women who are making products from various materials.
        - "If a woman makes a basket worth $2.50. How many lbs. of coffee at 25¢ per lb. can she get for it at the store?"
        - "It takes 3 yds. of gingham to make a dress for Emma and 2 times as much to make one for Jennie. How many yards will it takes to make a dress for Jennie?"

- "There are 19 girls in Company D and it takes 3 yds. of gingham to make school aprons for each. How many yards will it take to make aprons for all?"

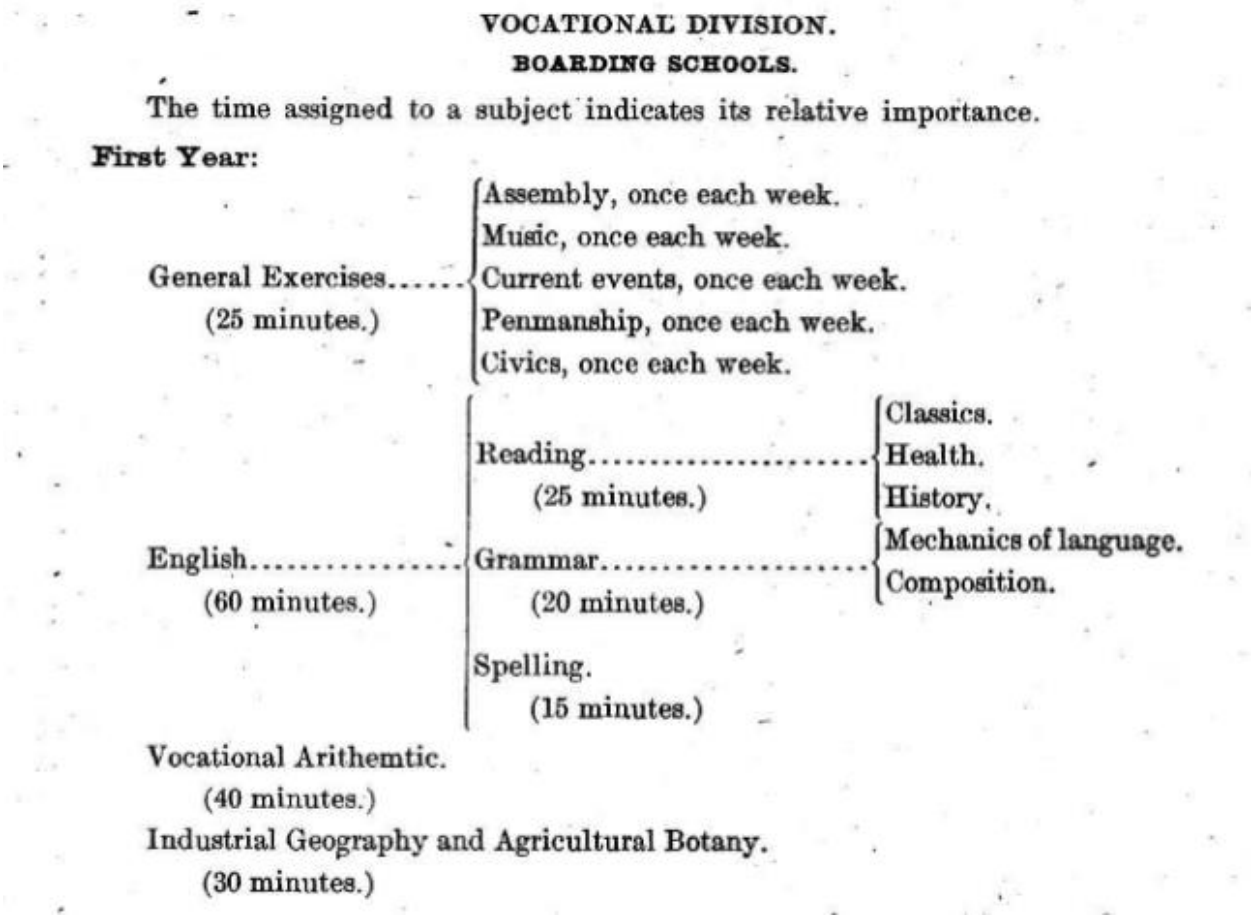
MISCELLANEOUS: This code refers to math problems that do not have a math answer. They are open-ended rather than require calculations.

- "Mary how many pints of water can I put in this pan? (Mary does not know). You may measure. What did you do? Give me another name for three pints?"
- "We are to paper, carpet, and furnish a three-room cottage, the dimensions of which are as follows:… What is the first thing to be done?...What are the dimensions of a roll of paper? How many sq. ft. in a roll, then? Will the merchant give you a fraction of a roll? …How shall we have the strips of this carpet run?.. Shall we carpet the other two rooms? What may be done with that?"
  [Note: This problem is part of a larger one that was too long to include here. The relevant parts of the problem are included instead.]

Appendix B

Courses of Study found in the 1916 Annual Report of the Commissioner of Indian Affairs to the Secretary of the Interior, for fiscal year ended June 30, 1916

Image 1b. Image of the Outline of Course of study for first year students in the vocational division



VOCATIONAL DIVISION.

BOARDING SCHOOLS.

The time assigned to a subject indicates its relative importance.

First Year:

General Exercises (25 minutes.)
- Assembly, once each week.
- Music, once each week.
- Current events, once each week.
- Penmanship, once each week.
- Civics, once each week.

English (60 minutes.)
- Reading (25 minutes.)
  - Classics.
  - Health.
  - History.
- Grammar (20 minutes.)
  - Mechanics of language.
  - Composition.
- Spelling. (15 minutes.)

Vocational Arithemtic. (40 minutes.)

Industrial Geography and Agricultural Botany. (30 minutes.)

Image 2b. Image of the Outline of Course of study for first year (continued) and second year students in the vocational division

First Year—Continued.

Breathing Exercises.
(10 minutes.)

Industrial Work (4 hours.)
- Drafting, 2 hours per week.
- Instruction, 1½ hours per week.
- Application, 20½ hours per week.

Physical Training (60 minutes.)
- Competitive group games, two or three lessons per week.
- Military and gymnastic drills, two or three lessons per week.

Study.
(60 minutes.)

Meals, free time, extra detail.
(6 hours 15 minutes.)

Sleep.
(9 hours.)

Second Year:

General Exercises (25 minutes.)
- Assembly, once each week.
- Music, once each week.
- Current events, once each week.
- Civics, once each week.
- Penmanship, once each week.

English (60 minutes.)

Reading (25 minutes.)
- Business papers, first term.
- Classics.
- General agriculture.
- History, second term.
- Health.

Grammar (20 minutes.)
- Mechanics of language.
- Composition.

Spelling.
(15 minutes.)

Vocational Arithmetic and Farm and Household Accounts.
(40 minutes.)

History, first term.

Soils and Soil Fertility, second term.
(30 minutes.)

Breathing Exercises.
(10 minutes.)

Industrial Work (4 hours.)
- Drafting, 2 hours per week.
- Instruction, 1½ hours per week.
- Application, 20½ hours per week.

Physical Training (60 minutes.)
- Competitive group games, two or three lessons per week.
- Military and gymnastic drills, two or three lessons per week.

Study.
(60 minutes.)

Image 3b. Image of the Outline of Course of study for second year (continued), third year, and fourth year students in the vocational division

Second Year—Continued.

Meals, free time, extra detail.
(6 hours 15 minutes.)

Sleep.
(9 hours.)

Third Year:

General Exercises (25 minutes.):
- Assembly, once each week.
- Music, once each week.
- Current events, once each week.
- Civics, once each week.
- Miscellaneous, once each week.

English (60 minutes.):
- Reading:
  - Classics.
  - History of materials used in different vocations.
  - Health.
  - History.
- Composition:
  - Written.
  - Mechanics of language.
  - Spelling.
  - Grammar.
  - Rhetoric.

Farm and Household Physics, and Chemistry (alternate).
(70 minutes.)

Breathing Exercises.
(10 minutes.)

Industrial Work (4 hours.):
- Drafting, 2 hours per week.
- Instruction, 1½ hours per week.
- Application, 20½ hours per week.

Physical Training (60 minutes.):
- Competitive group games, two or three lessons per week.
- Military and gymnastic drills, two or three lessons per week.

Study.
(60 minutes.)

Meals, free time, extra detail.
(6 hours 15 minutes.)

Sleep.
(9 hours.)

Fourth Year:

General Exercises (25 minutes.):
- Assembly, once each week.
- Music, once each week.
- Current events, once each week.
- Civics, once each week.
- Miscellaneous, once each week.

Image 4b. Image of the Outline of Course of study for fourth year (continued) students in the vocational division

Fourth Year—Continued.

- English (45 minutes.)
  - Reading
    - Study materials—history of, supply, demand, where.
    - Classics.
    - History.
    - Health.
  - Composition
    - Written.
    - Mechanics of language.
    - Spelling.
    - Grammar.
    - Rhetoric.
- Breathing Exercises. (10 minutes.)
- Rural Economics, and Insects and Insecticides (alternate). (40 minutes.)
- Field Crops and Plant Diseases (alternate). (45 minutes.)
- Industrial Work (4 hours.)
  - Instruction, 1½ hours per week.
  - Application, 22½ hours per week.
- Physical Training (60 minutes.)
  - Competitive group games (two or three lessons per week).
  - Military and gymnastics drills (two or three lessons per week).
- Study. (60 minutes.)
- Meals, free time, extra detail. (6 hours 15 minutes.)
- Sleep. (9 hours.)