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STEAME ACADEMY
TEACHING FACILITATION LEARNING & CREATIVITY PLAN (L&C PLAN) - LEVEL 2
SERVICE TEACHERS: “Understanding Population Dynamics: Exploring Demography Through Age Pyramids and City Demographics”

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1. Overview

Title	"Understanding Population Dynamics: Exploring Demography Through Age Pyramids and City Demographics"		
Driving Question or Topic	How has the population growth rate evolved in your town? Why do populations grow? How do age pyramids work and how can we use them to make population projections??		
Ages, Grades, ...	14-16	9th to 10th grade	
Duration, Timeline, Activities	10 learning hours	Five 60 minute class periods	Number of activities: 15
Curriculum Alignment	Social Studies, demography Maths Technology		
Contributors, Partners	Students, teachers		
Abstract - Synopsis	This lesson plan covers diverse activities for a deep dive into population dynamics. Students start by discussing global population trends, understanding their real-world effects. They then explore age pyramids, linking shapes to demographic stages. Next, they calculate birth and death rates to see how they shape populations. Moving on, students learn about percentages and population projections through hands-on practice. Finally, they work in groups to create age pyramids for specific cities, presenting and analyzing population patterns and their impacts. These activities blend theory with practical learning for a holistic grasp of demography.		
References, Acknowledgements	https://populationeducation.org/classroom-activities-for-teaching-about-population-growth-webinar-recap/		

2. STEAME ACADEMY Framework*

Teachers' Cooperation	<p>The social science teacher leads discussions on population growth and demography, introducing core concepts and facilitating talks about global population trends and their societal impact. They delve into birth and death rates, explaining how they shape populations and highlighting their real-world significance. Their role focuses on providing a broad understanding of population dynamics and their implications.</p> <p>The math teacher supports by reinforcing mathematical aspects like percentages, age pyramids, and population projections, helping with calculations, clarifying</p>
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STEAME in Life (SiL) Organization	the math behind birth and death rates, and guide students in creating city-specific age pyramids.
	The technology teacher helps students to use text editing applications, multimedia presentations and digital data processing for the production of digital documents.
	Working together, these teachers ensure students comprehend the mathematical side of demographic analysis, blending it seamlessly with broader societal contexts, and are able to represent ideas about it with digital tools.
Action Plan Formulation	Meet with organizations that are using demographic data to achieve their goals. For example: <ul style="list-style-type: none"> ● Insurance companies can use demographic data (age, gender, marital status, income) to reach consumers with targeted campaigns that speak to their needs and depict consumers who look like their target audience ● Companies offering goods and services can regulate their production from the projection of population by age and sex, in different socio-economic strata. For example, the future demand of feeding bottles for children will depend on the projected number of children in the future. ● Governments may use projections of the future age and sex composition of the population for estimating the incidence and prevalence of various diseases and planning for the number of hospitals, hospital beds and specialized facilities as well as training programmes for medical specialists.
	STAGE I: Preparation by three teachers [STEPS 1-4], STAGE II: Action Plan Formulation [Preparation STEPS 1-18]

* under development the final elements of the framework

3. Objectives and Methodologies

Learning Goals and Objectives	1- Knowledge <ul style="list-style-type: none"> ● Define key demographic terms: population, birth rate, death rate, migration. ● Identify different shapes of age pyramids and correlate them with demographic transition stages. ● Explain the significance of percentages in demographic analysis and population projections. ● Understand the main affordances of data treatment and visualisation tools 2- Skills <ul style="list-style-type: none"> ● Calculate birth and death rates using demographic data. ● Construct age pyramids for specific cities based on demographic information. ● Analyze population distributions and trends using age pyramids. ● Draw graphs and other visual representations of demographic data using appropriate digital tools 3- Attitudes <ul style="list-style-type: none"> ● Appreciate the real-world implications of population dynamics on societies. ● Collaborate effectively in group activities, contributing ideas and sharing findings. ● Recognize the value of interdisciplinary knowledge, integrating math, social sciences and technology in understanding demographic phenomena.
	1- Understand the fundamentals of population dynamics, explaining population trends and their societal implications. 2- Analyze age pyramids from diverse regions, correlating shapes with demographic transition stages.
Learning Outcomes and expected Results	

	<p>3- Calculate birth and death rates, demonstrating their impact on population growth.</p> <p>4- Apply percentage calculations and create population projections based on demographic data.</p> <p>5- Collaborate effectively in groups to construct age pyramids for specific cities</p> <p>6- Present insightful analyses of population distributions and their implications</p> <p>7- Create collaborative digital visual representations of mathematical data on population trends</p>
Prior Knowledge and Prerequisites	<ol style="list-style-type: none"> 1. Basic Social Science Understanding: familiarity with social sciences or geography will help in grasping demographic concepts. 2. Statistics: Knowing percentages and basic data analysis and even spreadsheets knowledge will aid in calculations related to population rates. 3. Data Interpretation: Experience in understanding and interpreting data will be useful for analyzing population statistics. 4. Critical Thinking: Having good critical thinking abilities will assist in understanding the implications of demographic changes. 5. Group Work Experience and oral skills: Past experience in group work will be beneficial during the activity involving city-specific age pyramid creation and presentations. 6. Basic concepts of operating systems 7. Basic command of spreadsheet software
Motivation, Methodology, Strategies, Scaffolds	<p>The teaching methodology for this lesson plan involves a combination of interactive lectures, discussions, hands-on activities, and group work to ensure a comprehensive understanding of demographic concepts.</p> <ol style="list-style-type: none"> 1. Interactive Lectures: The social science teacher uses lectures to introduce key concepts and engage students in discussions about population dynamics, demographic transitions, and their societal impacts. The mathematics teacher uses lectures to explain key formulas to calculate demographic data. The technology teacher demonstrates the basic functions of data processing and visualisation software. 2. Hands-on Activities: Calculation exercises and data analysis tasks are employed to give students practical experience in computing birth and death rates, understanding percentages, and creating population projections. 3. Group Work: The collaborative activity, where students create age pyramids for specific cities, as well as the data visualisation exercise foster teamwork and allows for practical application of learned concepts. It encourages discussion and analysis of population distributions. 4. Presentations: The culminating group presentations provide an opportunity for students to showcase their understanding of demographic data interpretation and articulate their findings to their peers. 5. Reflection and Discussion: Throughout the sessions, moments for reflection and open discussions are included to encourage critical thinking, allowing students to consolidate their learning and share perspectives. <p>This blended approach combines theoretical concepts with practical applications, fostering an engaging and comprehensive learning experience.</p>

4. Preparation and Means

Preparation, Space Setting, Troubleshooting Tips	<p>For the lesson plan on population growth and demography, various procedures, spaces, and materials are required:</p> <ol style="list-style-type: none"> 1. Procedures: <ul style="list-style-type: none"> ○ Access to reliable demographic data and graphs for analysis. ○ Preparation of calculation exercises for birth and death rates.
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<p>Resources, Tools, Material, Attachments, Equipment</p> <p><i>Health and Safety</i></p>	<ul style="list-style-type: none"> ○ Group formation and assignment of city-specific age pyramid creation tasks. ○ Rubrics or criteria for assessing group presentations. <p>2. Spaces:</p> <ul style="list-style-type: none"> ○ Access to a classroom with adequate seating and a whiteboard or screen for presentations. ○ Collaborative spaces for group activities and discussions. ○ Access to technology for data presentations or calculations, if necessary. <p>3. Materials:</p> <ul style="list-style-type: none"> ○ Demographic data sets and graphs from various countries. ○ Calculation sheets or software for birth and death rate calculations. ○ Chart papers, markers, or presentation materials for group presentations. ○ Data processing and visualisation software <p>The ideal classroom setting for this lesson plan would feature a flexible space that accommodates various teaching styles and activities:</p> <p>1. Seating Arrangement:</p> <ul style="list-style-type: none"> ○ Configurable seating allowing for group discussions and collaboration. ○ Ample space for presentations and visual aids. <p>2. Technology Integration:</p> <ul style="list-style-type: none"> ○ Access to audio-visual aids for presenting demographic data. ○ Availability of computers or calculators for quantitative exercises. ○ Wi-fi / internet to access data and support collaboration <p>3. Interactive Learning Environment:</p> <ul style="list-style-type: none"> ○ Wall space for displaying demographic data charts or age pyramids. ○ Areas designated for group work to encourage collaboration. <p>4. Resource Accessibility:</p> <ul style="list-style-type: none"> ○ Easy access to demographic data resources and calculation tools. ○ Adequate lighting and a conducive environment for discussions and presentations. <p>Free lesson plans from the website Population Education include different age pyramids and even short activities to teach demographic concepts. https://populationeducation.org/classroom-activities-for-teaching-about-population-growth-webinar-recap</p> <p>There are no particular safety measures required by this L&C Plan.</p> <p>While the plan itself doesn't inherently pose health or safety risks, it's essential to consider specific activities. For instance, guidelines and ergonomic practices must be followed when using technology or equipment to prevent injury. Conducting a risk assessment before activities and providing supervision ensure student well-being throughout the lesson.</p>
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5. Implementation	
<p>Instructional Activities, Procedures, Reflections</p>	<p>Session 1: Introduction to Population Growth</p> <p>1. Teacher's Actions:</p> <ul style="list-style-type: none"> ○ Social Science Teacher: <ul style="list-style-type: none"> ■ Starts discussions on population growth and its significance. ■ Introduces demographic terms and global population trends. ○ Math Teacher:

- Presents historical population data and its graphical representation.
- Guides students in interpreting the data's quantitative aspects.
- Technology teacher:
 - Gives an overview of the importance of data visualization

2. Student Tasks:

- Engage in discussions about population trends and demographic terms.
- Analyze and interpret the presented historical data.
- Explore digital tools for population simulations and data visualization

Session 2: Age Pyramids and Demographic Transition Model

1. Teacher's Actions:

- Social Science Teacher:
 - Discusses age pyramids and their relevance to demographic transitions.
 - Leads analysis of age pyramids from various countries.
- Math Teacher:
 - Assists in understanding numerical aspects within the age pyramids.
- Technology teacher:
 - Shows how to apply digital tools to the representation of age pyramids

2. Student Tasks:

- Analyze age pyramids from different countries.
- Identify patterns and link them to demographic transition stages.
- Represent age pyramids through one or more digital tools

Session 3: Birth and Death Rates

1. Teacher's Actions:

- Social Science Teacher:
 - Explains birth and death rates' significance in population dynamics.
 - Provides demographic data for rate calculations.
- Math Teacher:
 - Guides students through calculating birth and death rates.
- Technology teacher
 - Introduces a population simulation tool where students can manipulate birth and death rates to observe the impact on population growth, such as <https://www.populationpyramid.net/>.

2. Student Tasks:

- Calculate birth and death rates using provided demographic data.
- Discuss and understand the implications of different rates.
- Manipulate birth and death rates on the simulation tool

Session 4: Percentages and Population Projections

1. Teacher's Actions:

- Social Science Teacher:
 - Explains the use of percentages in demographic analysis and projections.
 - Guides discussions on applying percentages to demographic trends.
- Math Teacher:
 - Assists students in applying percentage calculations to demographic data.
- Technology teacher:

- Has students use data visualization tools to visually represent their population projections such as <https://public.tableau.com/app/discover>

2. Student Tasks:

- Apply percentage calculations to analyze demographic data.
- Create population projections based on demographic trends.
- Use graphing tools to visually represent their population projections.

Session 5: Group Activity - Age Pyramid Presentation

1. Teacher's Actions:

- Social Science Teacher:
 - Facilitates group discussions on city-specific age pyramid creation.
 - Encourages critical analysis of population distributions.
- Math Teacher:
 - Ensures accuracy in mathematical representations within presentations.
- Technology teacher:
 - Supports students' explanation of the process they followed to visualize the data

2. Student Tasks:

- Collaborate in groups to create age pyramids for assigned cities.
- Analyze population distributions and societal impacts for presentation.
- Collaborate in groups to visually represent the data with digital tools

Assessment - Evaluation

Continuous formative evaluation involves:

1. Quizzes and Problem-Solving Exercises: Regular quizzes assessing knowledge of demographic terms, calculations of birth and death rates, and interpretation of age pyramids.
2. Group Presentation Rubrics: Evaluating group presentations on city-specific age pyramids, focusing on accuracy in data representation, depth of analysis, and understanding of societal implications.
3. Calculation Accuracy Checks: Assessing the accuracy of calculations made during sessions related to birth and death rates, percentages, and population projections.
4. Peer and Self-Assessment: Encouraging students to assess their and their peers' work during group activities, fostering a reflective approach to understanding and teamwork.
5. Open-Ended Questions: Posing open-ended questions in discussions to gauge students' critical thinking and application of demographic concepts to real-world scenarios

Presentation - Reporting - Sharing

As described in detail in the above sessions, there are different moments during the L&C plan where students are asked to share ideas, make presentations and to report about their work. In session 5, a presentation must be made.

Extensions - Other Information

Resources for the development of the STEAME ACADEMY Learning and Creativity Plan Template

In the case of learning through project-based activity

STEAME ACADEMY Prototype/Guide for Learning & Creativity Approach Action Plan Formulation

Major steps in the STEAME learning approach:

STAGE I: Preparation by one or more teachers

1. Formulating initial thoughts on the thematic sectors/areas to be covered
2. Engaging the world of the wider environment / work / business / parents / society / environment/ ethics
3. Target Age Group of Students - Associating with the Official Curriculum - Setting Goals and Objectives
4. Organization of the tasks of the parties involved - Designation of Coordinator - Workplaces etc.

STAGE II: Action Plan Formulation (Steps 1-18)

Preparation (by teachers)

1. Relation to the Real World – Reflection
2. Incentive – Motivation
3. Formulation of a problem (possibly in stages or phases) resulting from the above

Development (by students) – Guidance & Evaluation (in 9-11, by teachers)

4. Background Creation - Search / Gather Information
5. Simplify the issue - Configure the problem with a limited number of requirements
6. Case Making - Designing - identifying materials for building / development / creation
7. Construction - Workflow - Implementation of projects
8. Observation-Experimentation - Initial Conclusions
9. Documentation - Searching Thematic Areas (AI fields) related to the subject under study – Explanation based on Existing Theories and / or Empirical Results
10. Gathering of results / information based on points 7, 8, 9
11. First group presentation by students

Configuration & Results (by students) – Guidance & Evaluation (by teachers)

12. Configure STEAME models to describe / represent / illustrate the results
13. Studying the results in 9 and drawing conclusions, using 12
14. Applications in Everyday Life - Suggestions for Developing 9 (Entrepreneurship - SIL Days)

Review (by teachers)

15. Review the problem and review it under more demanding conditions

Project Completion (by students) – Guidance & Evaluation (by teachers)

16. Repeat steps 5 through 11 with additional or new requirements as formulated in 15
17. Investigation - Case Studies - Expansion - New Theories - Testing New Conclusions

STAGE III: STEAME ACADEMY Actions and Cooperation in Creative Projects for school students

Title of Project: _____

Brief Description/Outline of Organizational Arrangements / Responsibilities for Action

STAGE	Activities/Steps Teacher 1(T1) Cooperation with T2 and student guidance	Activities /Steps By Students Age Group: ____	Activities /Steps Teacher 2 (T2) Cooperation with T1 and student guidance
A	Preparation of steps 1,2,3		Cooperation in step 3
B	Guidance in step 9	4,5,6,7,8,9,10	Support guidance in step 9
C	Creative Evaluation	11	Creative Evaluation
D	Guidance	12	Guidance
E	Guidance	13 (9+12)	Guidance
F	Organization (SIL) STEAME in Life	14 Meeting with Business representatives	Organization (SIL) STEAME in Life
G	Preparation of step 15		Cooperation in step 15
H	Guidance	16 (repetition 5-11)	Support Guidance
I	Guidance	17	Support Guidance
K	Creative Evaluation	18	Creative Evaluation