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STEAME ACADEMY

TEACHING FACILITATION LEARNING & CREATIVITY PLAN (L&C PLAN) - LEVEL 1

STUDENT 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	5 learning hours	Five 60 minute class periods	5 sessions
Curriculum Alignment	Social Studies, demography Maths		
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 the math behind birth and death rates, and guide students in creating city-specific age pyramids.</p>
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	Working together, both teachers ensure students comprehend the mathematical side of demographic analysis, blending it seamlessly with broader societal contexts.
STEAME in Life (SiL) Organization	Provide teacher students with the opportunity to review local, state, or federal open data regarding demography.
Action Plan Formulation	<p>STAGE I: Preparation by two teachers [STEPS 1-4],</p> <p>STAGE II: Action Plan Formulation [Preparation STEPS 1-18]</p>

** under development the final elements of the framework*

3. Objectives and Methodologies

Learning Goals and Objectives	<p>1- Knowledge</p> <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. <p>2- Skills</p> <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. <p>3- Attitudes</p> <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 and social sciences in understanding demographic phenomena.
Learning Outcomes and expected Results	<p>1- Understand the fundamentals of population dynamics, explaining population trends and their societal implications.</p> <p>2- Analyze age pyramids from diverse regions, correlating shapes with demographic transition stages.</p> <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 and present insightful analyses of population distributions and their implications.</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.

<p>Motivation, Methodology, Strategies, Scaffolds</p>	<ol style="list-style-type: none"> 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. <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"> 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. 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. Group Work: The collaborative activity, where students create age pyramids for specific cities, fosters teamwork and allows for practical application of learned concepts. It encourages discussion and analysis of population distributions. 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. 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 for the student teachers.</p>
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4. Preparation and Means

<p>Preparation, Space Setting, <i>Troubleshooting Tips</i></p>	<p>For the lesson plan on population growth and demography, various procedures, spaces, and materials are required:</p> <ol style="list-style-type: none"> 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. Group formation and assignment of city-specific age pyramid creation tasks. Rubrics or criteria for assessing group presentations. Spaces: <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. Materials: <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. <p>The ideal classroom setting for this lesson plan would feature a flexible space that accommodates various teaching styles and activities:</p> <ol style="list-style-type: none"> Seating Arrangement: <ul style="list-style-type: none"> Configurable seating allowing for group discussions and collaboration.
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<p>Resources, Tools, Material, Attachments, Equipment</p>	<ul style="list-style-type: none"> ○ Ample space for presentations and visual aids. 2. Technology Integration: <ul style="list-style-type: none"> ○ Access to audio-visual aids for presenting demographic data. ○ Availability of computers or calculators for quantitative exercises. 3. Interactive Learning Environment: <ul style="list-style-type: none"> ○ Wall space for displaying demographic data charts or age pyramids. ○ Areas designated for group work to encourage collaboration. 4. Resource Accessibility: <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><i>Health and Safety</i></p>	<p>While this L&C Plan doesn't inherently pose health or safety risks, it's essential to consider specific activities. For instance, ensuring safe travel and outdoor supervision is crucial if students engage in fieldwork. Similarly, proper guidelines and ergonomic practices must be followed when using technology or equipment to prevent injury. Conducting a risk assessment before activities and providing supervision could ensure students' well-being throughout the lesson.</p>

5. Implementation

<p>Instructional Activities, Procedures, Reflections</p>	<p>Session 1: Introduction to Population Growth</p> <ol style="list-style-type: none"> 1. Teacher's Actions: <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: <ul style="list-style-type: none"> ■ Presents historical population data and its graphical representation. ■ Guides students in interpreting the data's quantitative aspects. 2. Student Tasks: <ul style="list-style-type: none"> ○ Engage in discussions about population trends and demographic terms. ○ Analyze and interpret the presented historical data. <p>Session 2: Age Pyramids and Demographic Transition Model</p> <ol style="list-style-type: none"> 1. Teacher's Actions: <ul style="list-style-type: none"> ○ Social Science Teacher: <ul style="list-style-type: none"> ■ Discusses age pyramids and their relevance to demographic transitions. ■ Leads analysis of age pyramids from various countries. ○ Math Teacher: <ul style="list-style-type: none"> ■ Assists in understanding numerical aspects within the age pyramids. 2. Student Tasks: <ul style="list-style-type: none"> ○ Analyze age pyramids from different countries. ○ Identify patterns and link them to demographic transition stages. <p>Session 3: Birth and Death Rates</p> <ol style="list-style-type: none"> 1. Teacher's Actions:
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- 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.
2. Student Tasks:
- Calculate birth and death rates using provided demographic data.
 - Discuss and understand the implications of different rates.

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.
2. Student Tasks:
- Apply percentage calculations to analyze demographic data.
 - Create population projections based on demographic trends.

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.
2. Student Tasks:
- Collaborate in groups to create age pyramids for assigned cities.
 - Analyze population distributions and societal impacts for presentation.

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. The presentation must include at least one slide with information about the chosen city, a slide with the process followed to create the pyramid, a slide with the population pyramid, and a closing slide with reflections and/or items to discuss.

*Extensions - Other
Information*

The presentation material will be shared with the teacher and other students in the online learning environment of the class, if available.

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
 - a. Both teacher 1 and 2 pose some initial reflections on population growth worldwide and its consequences.
2. Engaging the world of the wider environment / work / business / parents / society / environment/ ethics
 - a. Teacher 2 presents data resources to access population information stats.
3. Target Age Group of Students - Associating with the Official Curriculum - Setting Goals and Objectives
 - a. Association to regular Curriculum should be discussed in any specific given case.
 - b. For Goals and Objectives see part 3 of the L&C
4. Organization of the tasks of the parties involved - Designation of Coordinator - Workplaces etc.
 - a. Teacher 1 and 2 participate in all sessions, and each one intervenes in their specialty. More information regarding the organization can be found in section 2 and 5 of the lesson plan.

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

Preparation (by teachers)

1. Relation to the Real World – Reflection
 - a. Population has been growing, specially from the mid 20th Century. These growth concentrates in specific countries outside the EU but probably the population of our own countries have also grown significantly in the last 50 years.
2. Incentive – Motivation
 - a. Understand the challenges regarding population growth and its causes and consequences. Be able to interpret and even create age pyramids from birth and death rates by sex.
3. Formulation of a problem (possibly in stages or phases) resulting from the above
 - a. Based on the data analysis of demographics, students will be able to understand how population has been growing, taking into account geographical differences and also getting to know the case of their own cities/towns.

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

4. Background Creation - Search / Gather Information
 - a. *Engage in discussions about population trends and demographic terms.*
 - b. *Analyze and interpret the presented historical data.*
5. Simplify the issue - Configure the problem with a limited number of requirements
6. Case Making - Designing - identifying materials for building / development / creation
 - a. See implementation section (number 5).
7. Construction - Workflow - Implementation of projects
 - a. *Collaborate in groups to create age pyramids for assigned cities.*
 - b. *Analyze population distributions and societal impacts for presentation.*

8. Observation-Experimentation - Initial Conclusions
 - a. *Analyze age pyramids from different countries.*
 - b. *Identify patterns and link them to demographic transition stages.*
 - c. *Calculate birth and death rates using provided demographic data.*
 - d. *Discuss and understand the implications of different rates.*
 - e. *Apply percentage calculations to analyze demographic data.*
 - f. *Create population projections based on demographic trends.*
9. Documentation - Searching Thematic Areas (AI fields) related to the subject under study – Explanation based on Existing Theories and / or Empirical Results
 - a. See implementation section (number 5).
10. Gathering of results / information based on points 7, 8, 9
 - a. Results should be gathered and prepared for presentation.
11. First group presentation by students
 - a. *Results of working groups are presented and discussed with peers.*

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

12. Configure STEAME models to describe / represent / illustrate the results
 - a. Collected age pyramids and population projections made by students can be presented e.g. in a form of an infographic (created with Canva, and using a spreadsheet software).
13. Studying the results in 9 and drawing conclusions, using 12
 - a. Students are encouraged to draw conclusions on the topic of demography and population growth, its causes and consequences and projections .
14. Applications in Everyday Life - Suggestions for Developing 9 (Entrepreneurship - SIL Days)
 - a. Students can use these competences for other graph representations and to be skillful with spreadsheet software regarding data and data representation using graphs.

Review (by teachers)

15. Review the problem and review it under more demanding conditions
 - a. Other data can be used in order to compare different population data or different data according to different years.

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
18. Presentation of Conclusions - Communication Tactics.
 - a. A poster session could be celebrated in school (or even outside) where students could share their age pyramids and population projections.

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

Title of Project: _____ *"Understanding Population Dynamics: Exploring Demography Through Age Pyramids and City Demographics"* _____

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: __14-16__	Activities /Steps Teacher 2 (T2) Cooperation with T1 and student guidance
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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 Students will know official websites with data sets and stat repositories of open data regarding population.	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