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GLOBAL CHALLENGES OF THE 21ST CENTURY: DESIGN AND IMPLEMENTATION OF ELECTIVE COURSE FOR GRADES 10–11

Annotation. This paper reports on the design and forthcoming implementation (AY 2025–2026) of the author's elective "Global Challenges of the 21st Century" for Grades 10–11 (34 contact hours, one hour weekly) at KGU Gymnasium No. 4 named after A. S. Pushkin, Almaty. The course builds scientific and critical thinking, scientific literacy, and civic responsibility by engaging students with demographic, environmental, socio-economic and technological transformations shaping today's world. We present an instructional model that aligns the Sustainable Development Goals with upper-secondary geography: from posing problem-based questions and working with data to project work and argumentative communication. The syllabus comprises five modular strands and a capstone project defense; learning activities include dialogue lectures, map- and data-based inquiry, case analysis, and a Model-UN role-play game. Assessment follows a criterion-referenced approach mapped to Bloom's taxonomy, with descriptors for knowledge, understanding, application, analysis, synthesis, and evaluation. Expected learning outcomes and monitoring instruments are discussed, along with opportunities for cross-curricular integration with economics, biology, history and social studies.

Keywords: global challenges; sustainable development; upper-secondary; curriculum design; critical thinking; project-based learning; assessment.

Introduction

Schools need courses that help students make sense of global change and act with responsibility. Geography in upper-secondary grades can connect people, places, and environments through maps, tables, and texts. Our elective organizes learning around a small set of cross-cutting questions and evidence norms. This design keeps language clear and steps repeatable so that translation into Russian and Kazakh is direct and accurate. [1]

We align the elective with widely used frameworks. The Sustainable Development Goals provide a shared vocabulary for targets and indicators. UNESCO's roadmap on Education for Sustainable Development helps schools translate goals into

practical classroom actions. For climate science, the IPCC Synthesis Report offers careful headline statements that can be used without specialized background. For data, we rely on official datasets from the World Bank, the United Nations, and the World Health Organization. These sources are open, stable, and suitable for school use. [1–4]

Regional didactic research informs delivery. Integrated learning connects physical, economic, and social geography within one lesson. Flipped learning shifts exposition out of class so that precious class time can be used for analysis and feedback. Practice-oriented tasks on low-carbon development provide an authentic domain for argument and decision making in Grade 10–11. [5–7]

The elective runs for one hour each week across the school year (34 hours total). The first implementation site is KGU Gymnasium No. 4 named after A. S. Pushkin, Almaty. The syllabus fits a standard timetable and requires modest resources. Teachers use a compact lesson kit: a one-page concept outline, two visuals, and one task sheet. This economy supports scale and helps new teachers join quickly [8].

Materials and Methods

Design principles. Each two-hour micro-sequence follows a simple cycle: pose a question, analyze evidence, communicate a claim. The evidence set includes one map, one table or graph, and one short text. The claim is written in 120–150 words. The rubric has four criteria: data and method quality, argument and interpretation, communication, and civic or scientific relevance. [4]

Sources and alignment. We triangulate three anchors: (a) SDGs and UNESCO's ESD roadmap (values and goals); (b) IPCC (reliable climate science); (c) official international datasets (numbers students can verify). This keeps lessons current and evidence-based without advanced software. [1–4]

Teaching approaches. Before class, students may read a half-page note or watch a three-minute micro-lecture. In class, the teacher runs a short dialogue lecture, then groups analyze a map and a graph. Students write a brief and share it. This routine takes 35–40 minutes and leaves time for feedback. Integrated and flipped learning are used in precise, limited ways to support participation. [5,6]

Assessment approach. Formative checks happen every lesson and are short: read a legend, select a scale, describe a trend, name a cause. Summative checks occur after each strand and include a theme test, a short paper, and a capstone project presented to peers. The project rubric uses four criteria with four levels each (0–3). [4,7]

Ethics, inclusion, and feasibility. Tasks use public data and avoid personal information. Students work in mixed groups. Materials are readable, with clear fonts and high contrast. When internet access is weak, teachers use printed packets; all tasks have an offline version. The elective fits a weekly slot in diverse school settings. [8]

Results and discussion

Syllabus architecture. The 34-hour course is divided into six strands and a capstone [Table 1]. Strand 1 (2 h) introduces the idea of global challenges and maps SDG targets to course topics. Strand 2 (4 h) develops demographic reasoning with age pyramids, growth and dependency ratios, and migration cases. Strand 3 (8 h) focuses on climate and natural resources, including freshwater stress, land degradation, and biodiversity. Strand 4 (4 h) treats pollution and energy transitions. Strand 5 (8 h) examines

socio-political challenges such as inequality, health, food security, and conflict. Strand 6 (6 h) studies global governance and digitalization, including a Model-UN role-play and sustainable-city cases. The capstone (2 h plus homework) is a short research or civic project with a five-minute defense. [8]

Table 1 - Plan of the elective course

No.	Strand	Lesson focus (lecture)	Seminar / activity	Session descriptor	Product / assessment
1	1. Orientation & SDGs	Global challenges: definitions	Mapping SDG targets	define the term and name examples	60-word explanation
2	1. Orientation & SDGs	Sustainable development: principles	Goal–indicator mapping	link a local issue to one SDG target	brief with one indicator
3	2. Demography	Population growth and urbanization	Reading age pyramids	compute simple ratios	table of indicators
4	2. Demography	Demographic trend analysis	Urbanization maps	describe two trends with numbers	120-word note
5	2. Demography	Migration: drivers and impacts	Case packet (two cases)	distinguish push and pull	case comparison table
6	2. Demography	Migration: regional cases	Map of flows	name likely impacts	150-word policy brief
7	3. Climate & Resources	Climate change: causes/effects	Temperature anomaly maps	name two cause–effect links	annotated map
8	3. Climate & Resources	Climate models in plain language	Impact excerpts	summarize implications	Q&A sheet
9	3. Climate & Resources	Freshwater scarcity and pollution	Regional water data	cite two risks for one basin	bullet list (4 points)
10	3. Climate & Resources	Global water availability	Comparative graphs	compare two regions with one metric	70-word note

11	3. Climate & Resources	Land degradation and desertification	Land-use profiles	identify pressures	diagram (pressures–responses)
12	3. Climate & Resources	Avoiding land degradation	Case examples	name two prevention measures	short table
13	3. Climate & Resources	Biodiversity loss and protection	Protected areas map	explain importance	captioned figure
14	3. Climate & Resources	Species recovery; invasive risks	Case snapshots	assess risks and trade-offs	100-word brief
15	4. Pollution & Energy	Pollution types; waste reduction	Local examples	classify types	sorted list
16	4. Pollution & Energy	Sustainability solutions	Best-fit options	justify a choice	criteria grid
17	4. Pollution & Energy	Energy resources and alternatives	Source profiles	contrast two sources	two-column table
18	4. Pollution & Energy	Comparing energy systems	Life-cycle and trade-offs	argue for a mix	argument paragraph
19	5. Socio-political Challenges	Poverty, jobs, education	Inequality indicators	explain disparities	chart interpretation
20	5. Socio-political Challenges	Regional economies	GDP & structure	relate structure to jobs	80-word note
21	5. Socio-political Challenges	Health systems and access	Health coverage maps	identify challenges	short memo
22	5. Socio-political Challenges	Pandemics: causes and lessons	Outbreak timeline	name two lessons	timeline captions
23	5. Socio-political Challenges	Food security	Supply/demand data	assess risks	risk table
24	5. Socio-political Challenges	FAO and program design	Program briefs	evaluate one program	criteria-based review

25	5. Socio-political Challenges	Security and conflict	Institution roles	outline roles	flow diagram
26	5. Socio-political Challenges	Regional conflicts	Case packet	analyze causes	case summary
27	6. Governance & Digitalization	International organizations	Mandates and functions	match roles to cases	matching sheet
28	6. Governance & Digitalization	UN simulation	Rules and procedures	negotiate a clause	draft resolution (100 words)
29	6. Governance & Digitalization	Technology and digital divide	Access indicators	explain effects	indicator summary
30	6. Governance & Digitalization	AI and cyber risks	Neutral case notes	weigh risks and benefits	pros/cons table
31	6. Governance & Digitalization	Sustainable development revisited	Indicator review	synthesize learning	exit ticket
32	6. Governance & Digitalization	Sustainable cities	Case comparison	adapt ideas to context	adaptation note
33	Capstone	Project synthesis	Consultation	finalize evidence set	project outline
34	Capstone	Capstone presentations	Viva with Q&A	defend claims with data	5-minute talk + Q&A

Authors' Own Work

The table shows how each hour yields a product that builds toward the capstone. The routine makes reasoning visible and supports language development. Where connectivity is limited, all activities have offline versions using printed packets. [8]

Strand 1 — Orientation and SDGs (2 hours). Students learn what the term “global challenges” means. They map SDG targets to course topics. They write a short paragraph explaining how one local issue connects to a global goal [1,2].

Strand 2 — Demography (4 hours). Students examine age pyramids, growth rates, and urbanization. They compute dependency ratios and compare two countries. They study migration drivers and impacts using case summaries. The product is a 150-word policy brief that predicts pressures on education, jobs, or pensions in one context.

Strand 3 — Climate and Natural Resources (8 hours). Students analyze drivers and impacts of climate change. They study water stress in Kazakhstan and globally. [9-10] They examine land degradation and desertification. They discuss biodiversity loss

and invasive species. Lessons use maps, time-series graphs, and short texts. IPCC headline statements anchor claims [3].

Strand 4 — Pollution and Energy (4 hours). Students classify pollution types and discuss waste reduction. They compare energy sources using simple life-cycle externalities and system trade-offs. They make a table that contrasts at least four sources by efficiency, reliability, cost, and environmental impact. They defend an energy mix for a hypothetical city.

Strand 5 — Socio-Political Challenges (8 hours). Students analyze poverty and inequality, access to education and health, pandemics and health security, food security, and conflict. They use official datasets and short institutional notes. They practice writing claims that use numbers and name uncertainty [4].

Strand 6 — Global Governance and Digitalization (6 hours). Students study the role of international and regional organizations. They run a short Model-UN role-play. They evaluate digital transformation and the digital divide. They reflect on AI and cyber risks with simple, non-technical cases. They examine sustainable city case studies and discuss what can be adapted to local conditions.

Capstone (2 hours plus homework). Students present and defend a small research or civic project. The project uses at least two independent sources and one visual. The defense is a five-minute talk with two questions from peers.

Learning outcomes. By the end of the course students can: identify and explain drivers of major global challenges; use maps, tables, and policy texts to analyze trends; compare solution strategies using explicit criteria; design and communicate a small project. These outcomes are mapped to Bloom’s levels and to task stems. The mapping helps teachers plan and helps students self-assess.

Task archetypes. We provide reusable templates. Example 1: a map-and-graph pairing that shows drought risk and agricultural yields. Students write two causal links. Example 2: a four-cell table comparing energy sources. Example 3: a data brief that uses two indicators to argue for one policy action. Example 4: a case comparison of two cities with different sustainability profiles.

Monitoring and feedback. Each lesson yields a product that goes into a learner portfolio. Teachers write two short comments: one on strength, one on next step. At weeks 10 and 25, students select one artifact to revise. They explain what changed and why. This builds metacognition.

Workload and feasibility. The lesson-kit approach reduces preparation time. Teachers reuse visual pairs and update only the numbers. The elective fits into a weekly slot. Where classes have strong internet, teachers can add interactive dashboards. Where access is limited, printed packets keep learning on track.

Coherence versus variety. The course balances a stable routine with diverse content and scales. The routine reduces cognitive switching costs. The variety keeps interest high. This balance supports knowledge integration, a key goal in senior-grade geography [5].

Depth without overload. The elective avoids superficial coverage by demanding evidence-based claims every week. At the same time, it limits the number of techniques.

Students practice the same moves in different contexts. Over time, they improve at reading maps, choosing indicators, and naming causes and consequences.

Role of research-informed methods. Integrated learning and flipped learning are not used as slogans. They are used in precise ways. Integrated learning aligns physical, economic, and social aspects within one task [5]. Flipped learning shifts some exposition out of class so that in-class time is used for analysis and feedback [6]. Both methods support equitable participation and allow more time for language support when needed.

Low-carbon practice tasks. Tasks that model choices about transport, energy efficiency, and urban greening give students a concrete domain for argumentation. They move discussion from ideology to criteria-based evaluation of trade-offs [7]. Students compare options, use data, and justify conclusions in plain language. This is vital for easy translation and for communication with parents and community members.

Risks and safeguards. Risks include duplication with the core syllabus, drift into advocacy, and unequal digital access. Safeguards include alignment maps, neutral source packets, offline alternatives, and rubrics that privilege method transparency over final position. Teachers receive guidance on moderating debate and on supporting students who need more time or language help.

Implementation in context. The first implementation will occur in 2025–2026 at KGU Gymnasium No. 4 named after A. S. Pushkin, Almaty. The site offers a realistic mix of resources. The program will collect teacher notes and student work samples to inform revisions in the next cycle.

Conclusion

This article described the design and implementation plan for a 34-hour elective on global challenges for Grades 10–11 [11-13]. The design centers a small set of repeatable analytical moves and uses open, authoritative sources. It is resource-light and feasible within a weekly period. It fosters scientific literacy, critical thinking, and civic responsibility.

The course described here offers a practical pathway for schools seeking to embed sustained, data-rich inquiry into upper-secondary geography without heavy resource demands. By centering a small repertoire of analytical moves and aligning products to a clear rubric, the design balances ambition with feasibility. The modular structure invites localization—schools can swap case studies and datasets to reflect regional realities—while preserving a stable progression from description to explanation to evaluation.

Next steps include collecting comparative performance data, analyzing portfolios for growth in evidentiary reasoning, and refining task banks based on teacher and student feedback. The broader contribution is a model for how a weekly elective can cultivate scientific literacy and civic competence regarding intertwined global challenges.

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XXI ҒАСЫРДЫҢ ЖАҺАНДЫҚ СЫН-ҚАТЕРЛЕРІ: 10–11 СЫНЫПТАРҒА АРНАЛҒАН ГЕОГРАФИЯ ПӘНІНЕН ЭЛЕКТИВТІ КУРСТЫ ЖОБАЛАУ ЖӘНЕ ЕНГІЗУ

Аңдатпа. Мақалада 2025–2026 оқу жылында Алматы қаласындағы «А.С. Пушкин атындағы №4 гимназияда» енгізілетін 10–11 сыныптарға арналған «XXI ғасырдың жаһандық сын-қатерлері» авторлық электив курсының (34 сағат, аптасына 1 сағат) жобалануы мен іске асыру тәсілдері ұсынылады. Курс оқушылардың ғылыми және сыни ойлауын, жаратылыстанымдық сауаттылығын, азаматтық жауапкершілігін қалыптастыруға бағытталған; демографиялық

үрдістер, климат пен табиғи ресурстар, ластану мен энергия, әлеуметтік-экономикалық теңсіздік, жаһандық басқару және цифрландыру сияқты тақырыптарды қамтиды. Мақалада ТДМ-мен (ЦУР) үйлескен дидактикалық үлгі, модульдік құрылым, карталар мен статистикамен жұмыс, «БҰҰ Моделі» рөлдік ойыны, жобалық жұмыс және Блум таксономиясына негізделген критериалды бағалау сипатталады. Күтілетін нәтижелер мен мониторинг тетіктері, пәнаралық байланыстардың мүмкіндіктері көрсетілген. Материал мұғалімдерге, әдіскерлерге және бағдарлама әзірлеушілеріне арналған.

Кілт сөздер: жаһандық сын-қатерлер; тұрақты даму; жоғары сынып; оқу бағдарламасы; сыни ойлау; жобаға негізделген оқу; бағалау.

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ГЛОБАЛЬНЫЕ ВЫЗОВЫ XXI ВЕКА: ПРОЕКТИРОВАНИЕ И ВНЕДРЕНИЕ ЭЛЕКТИВНОГО КУРСА ПО ГЕОГРАФИИ ДЛЯ 10–11 КЛАССОВ

Аннотация. Статья описывает разработку и предстоящее внедрение в 2025–2026 учебном году авторского элективного курса по географии «Глобальные вызовы XXI века» для 10–11 классов (34 ч., 1 ч. в неделю) в КГУ «Гимназия №4 им. А.С. Пушкина» (Алматы). Курс направлен на формирование научного и критического мышления, естественнонаучной грамотности и гражданской ответственности через системный анализ демографических, экологических, социально-экономических и технологических трансформаций современного мира. Предлагается дидактическая модель, связывающая цели устойчивого развития с логикой школьного курса: от постановки проблемных вопросов и работы с данными до проектной деятельности и аргументированного представления результатов. Описаны структура курса (пять модульных блоков и итоговая защита проекта), виды учебной деятельности (лекции-диалоги, работа с картами и статистикой, кейс-анализ, ролевая игра «Модель ООН»), а также критериально-дескрипторное оценивание, соотносящееся с уровнями таксономии Блума. Представлены ожидаемые результаты обучения и механизмы их мониторинга, показана применимость курса для интеграции межпредметных связей географии с экономикой, биологией, историей и обществоведением. Материал ориентирован на учителей, методистов и разработчиков программ, стремящихся обеспечить практико-ориентированное изучение глобальных процессов в старшей школе.

Ключевые слова: глобальные вызовы; устойчивое развитие; старшая школа; учебная программа; критическое мышление; проектное обучение; оценивание.