International Journal of Education, Vocational and Social Science
https://e-journal.citakonsulfindo.or.id/index.php/IJEVSS
E-ISSN : 2963 4954
IJEVSS

Thematic Mapping And STREAM Integration Design In Sociology: Developing A Teaching Module On Social Issues

Ike Arriany[1]
Sociology Education Study Program, Universitas Negeri Jakarta, Indonesia
Devi Septiandini
Sociology Education Study Program, Universitas Negeri Jakarta, Indonesia
Suyuti
Sociology Education Study Program, Universitas Negeri Jakarta, Indonesia
Zevanya Natasha
Sociology Education Study Program, Universitas Negeri Jakarta, Indonesia
Nayla Agusta Wibowo
Sociology Education Study Program, Universitas Negeri Jakarta, Indonesia
Dimas Ramadhan
Sociology Education Study Program, Universitas Negeri Jakarta, Indonesia

Corresponding Author: *ikearriany@unj.ac.id*

Abstract

This study aims to map Phase E sociology topics with potential for STREAM (Science, Technology, Reading, Engineering, Arts, and Mathematics) integration and to develop and evaluate a teaching module based on contemporary social issues. Previous STREAM and STEAM studies have concentrated on science and early education, and Indonesian studies often interpret the R element as religion, leaving sociology learning largely unexplored. Using design-based research, the study proceeded through curriculum and literature analysis, prototype design, formative review, expert validation, and revision. Two subject-matter validators and two media validators assessed the module, student worksheets, and higher-order thinking assessment with five-point instruments, and the ratings were analysed using mean scores and Aiken's V. The mapping produced three thematic units linking basic sociological concepts to adolescents' digital

[1] Corresponding author: Ike Arriany, Sociology Education Study Program, Universitas Negeri Jakarta. Email: ikearriany@unj.ac.id

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

experiences: fear of missing out, conflict in online chats, and role conflict. The module was rated very feasible by subject-matter experts (M = 4.81; V = 0.952) and media experts (M = 4.56; V = 0.889), with graphic design identified as the main area for revision. The study contributes an operational framework in which STREAM elements function as analytical tools and value-neutral sociological analysis is separated from value-based solution design.

Keywords: STREAM integration; sociology teaching module; contemporary social issues; design-based research; expert validation

INTRODUCTION

Sociology in secondary school is expected to equip students with a critical understanding of the society in which they live. In Indonesia, the current learning outcomes for Phase E (grade X) ask students to explain the function of sociology as a science that studies society critically, analytically, creatively, and solution-oriented, to examine the status and roles of individuals in social groups, and to give examples of the range of social phenomena in society (Kementerian Pendidikan Dasar dan Menengah, 2025a). The same document expects students to observe phenomena systematically, collect information from primary and secondary sources, draw conclusions, communicate results through digital and non-digital media, and plan follow-up actions. These outcomes frame sociology not as a static repository of terminologies to be committed to memory, but rather as an active engagement with the sociological imagination—a distinct analytical orientation for interrogating social realities.

Classroom practice often falls short of this expectation. Conventional methods remain common in sociology lessons, particularly for content that is treated as material to be memorised, and this tends to make lessons monotonous and students passive (Djunadi, 2015). More recent observations of sociology teaching under the Merdeka Curriculum report that teachers do integrate social values into lessons, but implementation is hindered by low student awareness of social values, heavy gadget use, and large classes (Salsabila et al., 2025). The result is a gap between the ideal of sociology as a tool for social awareness and the reality of lessons in which concepts remain abstract and detached from students' daily lives.

Meanwhile, a growing share of adolescents' social life takes place in digital spaces. Fear of missing out (FoMO), the apprehension that others are having rewarding experiences from which one is absent, is closely tied to social media engagement (Przybylski et al., 2013), and

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

research on it has expanded rapidly across disciplines (Tandon et al., 2021). Among Indonesian adolescents, cyberbullying is linked to stress, loneliness, problematic internet use, and daily social media time (Borualogo et al., 2025), as well as to self-control, empathy, parenting, and peer relationships (Rahmania et al., 2025). The spread of misinformation further calls for critical literacy and hoax awareness in digital learning (Adnan et al., 2025). These phenomena are sociological in nature, since they involve social facts, patterns of interaction, and the negotiation of status and roles, yet they seldom become the organising context of sociology lessons.

Indonesian education policy now promotes “Pembelajaran Mendalam”, a deep learning approach built on three principles, namely mindful, meaningful, and joyful learning, and three learning experiences, namely understanding, applying, and reflecting (Kementerian Pendidikan Dasar dan Menengah, 2025b; Lestari et al., 2026). This approach aligns with Fullan et al. (2018), who argue that modern education should move away from traditional learning and focus on helping students solve real-world problems. Integrative approaches such as STEAM and its extension STREAM offer one route to this kind of learning, because they connect scientific, technological, literary, and artistic ways of working around shared problems (Belbase et al., 2022; Ho et al., 2021).

The existing literature, however, leaves an important gap. Integrative STEAM research has been concentrated in science and mathematics, and reviews note that definitions of the integrated disciplines are inconsistent and that the added components are often treated superficially (Mejias et al., 2021; Perignat & Katz-Buonincontro, 2019). Studies of STREAM in Indonesia have developed science teaching materials and student worksheets and commonly interpret the R element as religion (Aprillia & Hutahaean, 2026; Azizah et al., 2021), while international STREAM studies emphasise reading within science subjects or examine science teachers' self-efficacy (Alanazi & Al-Zahrani, 2025; Grancharova, 2026). In social studies, STEAM appears mainly in conceptual proposals or local-culture projects in primary and lower secondary schools (Riviani et al., 2026; Salamah & Susapti, 2025). Development studies in sociology, in turn, have produced learning tools based on the sociological imagination and applied project-based learning, but without an integrative STREAM framework (Pratiwi & Hidayah, 2016; Septiandini et al., 2024). To our knowledge, no study has specified how STREAM elements can act as tools to develop students' sociological imagination regarding contemporary issues, or examined the feasibility of using this design for learning sociology in high schools

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

This study addresses that gap through two research questions: (1) which Phase E sociology topics best integrate with STREAM when framed around contemporary social issues, and (2) how feasible is a STREAM-integrated sociology teaching module—comprising a lesson plan, worksheets, and higher-order thinking assessments—based on expert validation? The study contributes operational definitions that use STREAM elements to activate the sociological imagination, a design principle that separates value-neutral analysis from value-based solutions, and a transparent account of the development cycle. The article concludes with a literature review, methodology, results, discussion, and conclusion.

LITERATURE REVIEW

From STEM to STREAM

STEAM emerged as an attempt to bring the arts and humanities into science, technology, engineering, and mathematics education in order to foster creativity, problem solving, and a more humanistic vision of schooling (Belbase et al., 2022; Perales & Aróstegui, 2024). An integrative review of 44 studies found that STEAM is defined inconsistently, that the arts component is interpreted in many ways, and that few studies report outcomes for creativity or arts learning (Perignat & Katz-Buonincontro, 2019). Mejias et al. (2021) argue that the arts are often used instrumentally in STEAM, as a means to make STEM more attractive, and propose that meaningful STEAM learning requires genuinely transdisciplinary environments in which each discipline contributes its own ways of knowing.

STREAM extends STEAM by adding reading, and in some formulations writing, as a core element. Ho et al. (2021) define STREAM as Science, Technology, Reading, Engineering, Arts, and Mathematics and argue that it promotes collaboration, communication, creativity, and critical thinking. Grancharova (2026) similarly treats reading as an integral part of interdisciplinary inquiry rather than a separate skill, noting that reading involves analysis, synthesis, and connection to real-life contexts. A second interpretation is common in Indonesia, where the R stands for religion and STREAM materials are developed for science topics in primary and senior high schools (Aprillia & Hutahaean, 2026; Azizah et al., 2021). Research indicates that a teacher's confidence and enjoyment directly influence how STREAM is taught, highlighting the need for institutional support and professional training (Alanazi & Al-Zahrani, 2025). Building on this need, this study adopts a reading-based definition of STREAM, as critical analysis of news, case studies, and data is essential for learning sociology.

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

Integrative Approaches in Social Studies and Sociology

Integrative approaches are beginning to appear in social studies. Riviani et al. (2026) propose an Ethno-STEAM model that combines STEAM with local wisdom to develop junior high students' social problem-solving skills, and Salamah and Susapti (2025) report that STEAM projects based on local culture stimulated creativity, collaboration, and conceptual understanding in primary social studies. Both studies, however, are either conceptual or limited to primary education. In sociology, Pratiwi and Hidayah (2016) developed senior high school learning tools based on the sociological imagination and validated them through expert judgment and a limited trial, while Septiandini et al. (2024) showed that project-based learning under the Merdeka Curriculum increased students' engagement, collaboration, critical thinking, and communication. Development studies for Phase E subjects typically report high expert validity scores, as in a project-based e-module for biology that was rated very valid by two lecturers and one teacher (Razinsyah et al., 2025). These studies show the value of contextual and project-based design but do not offer a framework for integrating STREAM into sociology.

The Deep Learning Approach in the Indonesian Curriculum

"Pembelajaran Mendalam" frames learning around three principles. Mindful learning makes students aware of the purpose and process of learning, meaningful learning connects content to real-life contexts, and joyful learning creates a positive and engaging atmosphere; these are realised through the learning experiences of understanding, applying, and reflecting (Kementerian Pendidikan Dasar dan Menengah, 2025b). A systematic review of 20 studies suggests that the integration of technology, pedagogy, and content supports all three principles by increasing engagement, awareness of learning goals, and critical thinking (Lestari et al., 2026). The approach also calls for differentiated instruction, which responds to students' readiness, interests, and learning profiles (Tomlinson, 2017). Differentiation by visual, auditory, and kinesthetic learning styles, although still widely believed by educators, lacks empirical support (Newton & Salvi, 2020), which has implications for how differentiation is designed in teaching modules.

Adolescents' Digital Lives as Sociological Content

Adolescents' digital experiences provide rich material for core sociological concepts. FoMO can be examined as a social phenomenon shaped by the structure of online interaction

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

(Tandon et al., 2021). Misunderstandings and conflict in group chats illustrate the conditions of social interaction, especially communication through indirect contact, and the shift from associative to dissociative forms of interaction. Cyberbullying among Indonesian adolescents is associated with both individual and relational factors (Borualogo et al., 2025; Rahmania et al., 2025). The roles adolescents perform as students, family members, friends, and content creators can be analysed through the concepts of self-presentation and role strain set out in the theoretical framework; a recent study of Generation Z Instagram users, for example, found that primary accounts serve as a curated front stage while second accounts function as a more expressive back stage (Ruslan et al., 2025). Framing these issues sociologically also connects learning to the Sustainable Development Goals, since education for sustainable development aims to build competencies such as critical thinking and collaborative problem solving (UNESCO, 2017).

Design-Based Research and Formative Evaluation

Design-based research develops practical solutions to educational problems through iterative cycles of analysis, design, evaluation, and revision, while generating design knowledge (McKenney & Reeves, 2019). Easterday et al. (2018) describe design research as a logic of iterative problem solving that links problem definition, design, and testing. A recent systematic review of design-based research shows that the quality of an intervention is commonly judged against criteria of validity, practicality, and effectiveness, with evaluation moving from local to broader contexts (Cela-Ranilla et al., 2025). Expert agreement on the quality of a product is often summarised with Aiken's V coefficient, which has been used in Indonesian research to compare content-validity indices (Retnawati, 2016).

Taken together, the literature shows that STREAM is promising but conceptually unsettled, that it has rarely been applied to sociology, and that contextual, issue-based sociology learning has not been connected to an integrative framework. The present study positions itself at this intersection by designing STREAM elements as analytical tools for contemporary social issues and evaluating the resulting module at the expert-review stage of formative evaluation.

RESEARCH METHOD

Research Approach

This study used design-based research (Anderson & Shattuck, 2012; McKenney & Reeves, 2019) and was conducted from March to October 2026 as a faculty basic research project. It

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

followed four phases: (1) analysis and exploration, in which Phase E learning outcomes and the literature were analysed to map topics with potential for STREAM integration; (2) design and construction, in which Prototype I of the module was developed; (3) evaluation, in which the prototype was reviewed formatively and then validated by experts; and (4) reflection and revision, in which the module was revised into Prototype III. Following the quality criteria of educational design research, which move from validity to practicality and effectiveness (Plomp & Nieveen, 2013), and the stages of formative evaluation, which proceed from expert review to one-to-one, small-group, and field trials (Tessmer, 1993), this article reports the expert-review stage. Figure 1 presents the research flow.

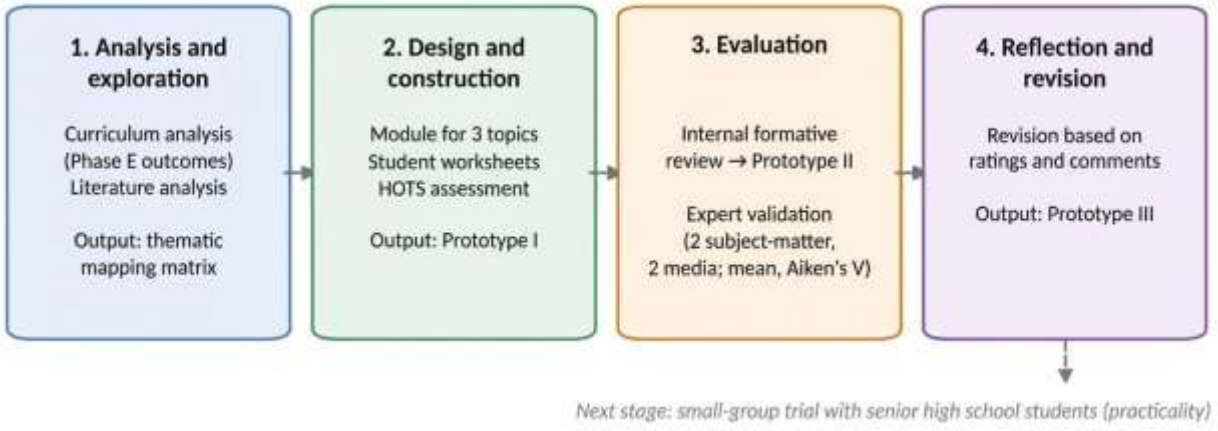


Figure 1. Research Flow

During the design phase, Prototype I underwent a structured formative review against curriculum, pedagogical, and conceptual criteria. This internal review produced specific findings and recommendations that the researchers carefully analyzed to refine the module, with the resulting revisions forming Prototype II. This step was treated as a preliminary design aid rather than formal validation data; all feasibility data reported in this study come strictly from human expert validation.

Types of Research Data

The study used qualitative and quantitative data. Qualitative data consisted of curriculum documents, literature, the content of the prototypes, and the written comments of the validators. Quantitative data consisted of the validators' ratings on five-point instruments.

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

Research Data Sources

The data sources were the Phase E learning outcomes for social studies (Kementerian Pendidikan Dasar dan Menengah, 2025a), the academic paper on the deep learning approach (Kementerian Pendidikan Dasar dan Menengah, 2025b), research literature on STREAM, sociology learning, and adolescents' digital lives, the three versions of the module, and four expert validators.

Techniques for Determining Respondents

Validators were selected purposively. Subject-matter validators were required to have expertise in sociology or sociology education, and media validators expertise in educational technology; all validators were required to have at least five years of relevant experience and not to be members of the research team. The subject-matter panel combined an academic and a practicing sociology teacher in order to capture both disciplinary accuracy and classroom feasibility. Table 1 presents the validators' profiles, which are reported with codes to protect their identities.

Table 1. Profile of the Validators

Code	Role	Degree	Field of expertise	Institution	Experience
V1	Subject matter and language (academic)	M.Pd	Sociology education	Universitas Negeri Jakarta	> 5 years
V2	Subject matter and language (practitioner)	S.Pd	Sociology	Public senior high school, Jakarta	> 5 years
V3	Media (academic)	M.Pd	Educational technology	Universitas Negeri Makassar	5 years
V4	Media (academic)	M.Pd	Educational technology	Universitas Negeri Jakarta	> 5 years

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

Research Instruments

Two validation instruments were used, each with a five-point scale (1 = very poor, 2 = poor, 3 = fair, 4 = good, 5 = very good). The subject-matter and language instrument contained 26 items in six aspects, and the media instrument contained 18 items in five aspects (Table 2). The instruments were developed from a blueprint derived from established feasibility criteria for teaching materials (content, presentation, language, and graphics) and from the distinctive features of the product, namely STREAM integration and the deep learning approach, and were reviewed by the research team. Each instrument also provided space for written comments and an overall judgment of feasibility.

Table 2. Blueprint of the Validation Instruments

Instrument and aspect	Indicators	Items
Subject matter and language: A. Content feasibility	Alignment with learning outcomes and objectives; conceptual accuracy; examples and cases; currency; level of difficulty	1–6
B. STREAM integration and deep learning	Integration of STREAM elements; STREAM as an analytical tool; deep learning principles; learning experiences; links to SDGs	7–11
C. Presentation feasibility	Completeness of components; systematic steps; time allocation; differentiation; alignment of worksheets	12–16
D. Assessment	Alignment of initial, process, and final assessment; HOTS items; clarity of rubrics	17–19
E. Language feasibility	Language conventions; terminology; suitability for students; communicativeness; clarity of instructions	20–24
F. Values, inclusivity, and safety	Free of ethnic, religious, racial, and group bias and stereotypes; student safety and privacy	25–26
Media: A. Appearance (graphics)	Readability; typography; layout; colour; relevance and quality of images; cover	1–7

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

Instrument and aspect	Indicators	Items
B. Visual communication	Visual clarity of information; visual flow of worksheets; creativity of design	8–10
C. Ease of use	Navigation; instructions; space in worksheets; printed and digital use	11–14
D. Use of technology	Suitability of digital tools; offline alternatives	15–16
E. Potential for learning	Curiosity; motivation	17–18

Data Collection Techniques

Data for the analysis phase were collected through document analysis of the curriculum and a review of the literature. Expert validation data were collected through Google Forms between August - September 2026. Each validator received the module for three topics, the student worksheets (LKPD), and the summative assessment, and completed the instrument independently.

Theoretical Framework

The design was guided by three bodies of theory. First, STREAM was defined following Ho et al. (2021) and operationalised so that each element functions as a tool of sociological analysis: science as social inquiry based on evidence, technology as digital tools for collecting and presenting data, reading as critical reading of informative texts, engineering as a design–test–improve cycle for social solutions, arts as creative communication of findings, and mathematics as the quantification of social phenomena. Second, learning activities followed the principles and learning experiences of the deep learning approach (Kementerian Pendidikan Dasar dan Menengah, 2025b). Third, the sociological content drew on the concepts of the science of sociology, social interaction, and status and role, including front-stage and back-stage self-presentation (Goffman, 1959) and role strain (Goode, 1960). A key design principle separated an analysis stage, in which phenomena are explained on the basis of data without moral judgment, consistent with the non-ethical character of sociology, from a solution-design stage based on values agreed upon by the class. Figure 2 presents this framework.

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

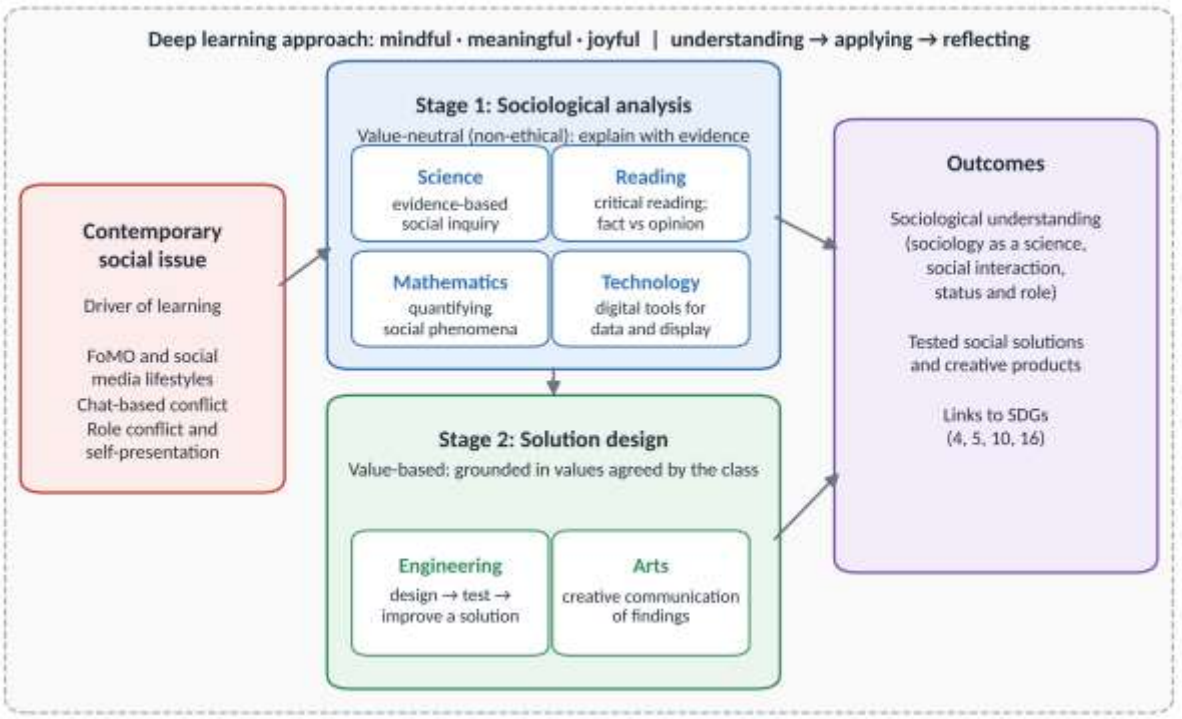


Figure 2. Framework for STREAM Integration in Sociology Learning

Data Analysis Techniques

Curriculum documents and literature were analysed through qualitative content analysis to produce a thematic mapping matrix. Validation ratings were analysed descriptively. Mean scores were calculated for each item, aspect, and instrument and interpreted with five categories based on an interval width of (5 − 1) ÷ 5 = 0.80 (Table 3). The product was considered feasible if every aspect reached at least the feasible category, and any item rated 1 or 2 by a validator was to be revised regardless of its mean. Agreement among validators on the quality of the product was calculated with Aiken's V, $V = \Sigma s \div [n(c - 1)]$, where $s = r - lo$, r is a validator's rating, lo is the lowest possible rating (1), c is the number of rating categories (5), and n is the number of validators (Aiken, 1985). Following common practice in Indonesian development research, $V > 0.80$ was interpreted as high agreement, $0.40 < V \leq 0.80$ as moderate, and $V \leq 0.40$ as low. Because V was computed from ratings of the product, it indicates agreement on the product's validity, not the validity of the instruments. The validators' written comments were analysed thematically and translated into revision decisions.

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

Table 3. Categories of Product Feasibility

Mean score	Category
4.21 – 5.00	Very feasible
3.41 – 4.20	Feasible
2.61 – 3.40	Fairly feasible
1.81 – 2.60	Less feasible
1.00 – 1.80	Not feasible

Data Credibility

Credibility was supported in four ways: the validators were independent of the research team; the panels combined academic and practitioner perspectives and came from two universities and one school; every rating was accompanied by the opportunity for written comment; and all revisions from Prototype I to Prototype III were recorded in a change log that links each change to the finding it addresses. The instruments themselves were not subjected to a separate empirical content-validity check before use, which is acknowledged as a limitation.

RESULT

Thematic Mapping of STREAM Integration

The analysis of the Phase E learning outcomes identified three topics with strong potential for STREAM integration when framed around adolescents' contemporary social issues: sociology as a science, social interaction, and status and role. For each topic, a social issue close to students' lives was selected as the driver of learning, and the six STREAM elements were assigned functions within the analysis and solution-design stages (Table 4). Each topic was also linked to two Sustainable Development Goals, with SDG 4 on quality education appearing in two of the three topics.

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

International Journal of Education, Vocational and Social Science
https://e-journal.citakonsultindo.or.id/index.php/IJEVSS
E-ISSN : 2963 4954
IJEVSS

Table 4. Thematic Mapping of STREAM Integration in Phase E Sociology

Topic	Contemporary social issue	STREAM integration	SDGs
1. Sociology as a science	FoMO and adolescent lifestyles on social media (consumption, communication with family, concentration while studying)	S: test assumptions about social media use with class poll data T: Google Forms or WhatsApp polling; Canva R: critical reading of news on FoMO (fact vs opinion, credibility) E: design, test, and improve a "filter before sharing" guide A: infographic or poster of findings M: percentages, charts, and the limits of one-class data	SDG 4, SDG 10
2. Social interaction	From chat to conflict: digital and face-to-face communication, imitation and identification in peer and fan communities, gender-biased comments	S: classify the conditions, driving factors, and forms of interaction from chat evidence T: compare text and voice messages; online survey R: case studies of cyberbullying and digital etiquette E: design, test, and improve a group-chat netiquette code A: four-panel comic or role-play of peaceful conflict resolution M: means of a comfort scale; frequency of causes of misunderstanding	SDG 5, SDG 16

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

Topic	Contemporary social issue	STREAM integration	SDGs
3. Status and role	Persona versus reality: role conflict among students who are also family members, organisation leaders, and content creators	S: identify types of status; distinguish role conflict from role strain T: log time with calendar or note apps; phone camera R: biographies and case studies of adolescents E: design, test, and improve a role-balancing matrix, including the gendered division of household tasks A: three-panel visual journal (front stage and back stage) M: percentages of daily time allocation; bar charts	SDG 4, SDG 5

Note. S = Science; T = Technology; R = Reading; E = Engineering; A = Arts; M = Mathematics.

The mapping shows that the three topics form a progression. The first establishes sociology as an empirical and non-ethical science using data that students generate themselves; the second applies this lens to relationships between people in digital and face-to-face settings; and the third examines the positions and roles that individuals hold within those relationships. In every topic, mathematics and science work together, since students quantify a phenomenon before explaining it, and engineering and arts translate the analysis into a tested solution and a communicable product.

Prototype Design and Formative Revision

Prototype I consisted of three modules, each containing student identification, material characteristics, graduate profile dimensions, learning outcomes and objectives, a STREAM integration table, a deep learning scenario, teacher and student reflections, assessment rubrics, and two essay questions, together with one student worksheet per module. The formative review identified 52 findings, 14 of which were judged to be of high priority. The main problems were inconsistent definitions of STREAM across the documents, STREAM elements that repeated the sociological content instead of serving as analytical tools, incomplete planning components, differentiation based on learning styles, limited assessment, and the absence of provisions for

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

student privacy and safety. Table 5 summarises the principal revisions that produced Prototype II.

Table 5. Main Revisions from Prototype I to Prototype II

Area	Prototype I	Prototype II
STREAM definition	Inconsistent across documents (reading/writing without mathematics; "reading and religion")	One definition (Ho et al., 2021) with operational definitions of each element
Function of STREAM	Some elements restated the sociological content	Each element has an analytical function; analysis and solution design are separated
Planning components	Time allocation blank; pedagogical model, partnerships, learning environment, and digital tools not specified	Five lesson hours per module; project-based learning syntax; partnerships; learning environment; digital tools with offline alternatives
Learning outcomes	Paraphrased and inconsistent across modules	Quoted from the 2025 learning outcomes and identical in all modules
Differentiation	By visual, auditory, and kinesthetic learning styles	By readiness, interest, and learning profile
Assessment	Two essay questions; rubric for three elements; inconsistent scales	Initial assessment; rubric for six elements on a 1–4 scale; four HOTS items per module with scoring rubrics
Conceptual accuracy	Imprecise answer keys (e.g., suggestion and empathy); leftover draft text	Corrected concepts; forms and sub forms of interaction; role strain; self-presentation
Safety and inclusivity	No provisions; religion-specific content in the reading element	Anonymous polling, fictional cases, voluntary sharing, counsellor referral, photo consent; shared values

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

Area	Prototype I	Prototype II
Student worksheets	Not referenced in the lesson steps; worksheet for topic 3 incomplete	Linked to each step; worksheet for topic 3 rebuilt; print-ready files

The resulting Prototype II is a teacher's lesson plan with student worksheets. Each module is implemented over five lesson hours of 45 minutes: two meetings of two lesson hours, in which the first meeting covers the analysis stage (worksheet parts A and B) and the second covers solution design, creative products, and reflection (parts C and D), followed by one lesson hour for the summative assessment.

Expert Validation

Table 6 presents the results of the subject-matter and language validation. The module obtained an overall mean of 4.81, in the very feasible category, with high agreement between validators (V = 0.952). All six aspects were rated very feasible, no item received a rating of 1 or 2, and every item had a V value of at least 0.875. Assessment and the aspect of values, inclusivity, and safety received the highest ratings (5.00), whereas STREAM integration and deep learning received the lowest (4.60), because V1 rated four items in this aspect as good rather than very good: the integration of the STREAM elements, the function of STREAM as an analytical tool, the application of the deep learning principles, and the sequence of learning experiences.

Table 6. Results of the Subject-Matter and Language Validation

Aspect	V1	V2	Mean	Category	Aiken's V	Agreement
Content feasibility	4.67	5.00	4.83	Very feasible	0.958	High
STREAM integration and deep learning	4.20	5.00	4.60	Very feasible	0.900	High
Presentation feasibility	4.40	5.00	4.70	Very feasible	0.925	High

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

Aspect	V1	V2	Mean	Category	Aiken's V	Agreement
Assessment	5.00	5.00	5.00	Very feasible	1.000	High
Language feasibility	4.80	5.00	4.90	Very feasible	0.975	High
Values, inclusivity, and safety	5.00	5.00	5.00	Very feasible	1.000	High
Overall	**4.62**	**5.00**	**4.81**	**Very feasible**	**0.952**	**High**

Source: research data (2026).

Both subject-matter validators judged the module feasible. V1 commented that the module was already strong in integrating STREAM within deep learning, and V2 described it as comprehensive, coherent, and innovative, noting that the integration of the deep learning principles, STREAM, and adolescents' digital social issues is highly relevant to twenty-first-century learning. V2 selected the option of feasibility with revision on the form but wrote no revision suggestions and subsequently confirmed in writing that no revision was required.

Table 7 presents the results of the media validation. The module obtained an overall mean of 4.56, in the very feasible category, with high agreement (V = 0.889). All aspects were rated very feasible and no item was rated 1 or 2. Appearance (graphics) was the lowest-rated aspect (4.43).

Table 7. Results of the Media Validation

Aspect	V3	V4	Mean	Category	Aiken's V	Agreement
Appearance (graphics)	4.29	4.57	4.43	Very feasible	0.857	High
Visual communication	4.33	4.67	4.50	Very feasible	0.875	High

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

Aspect	V3	V4	Mean	Category	Aiken's V	Agreement
Ease of use	4.25	5.00	4.63	Very feasible	0.906	High
Use of technology	4.50	5.00	4.75	Very feasible	0.938	High
Potential for learning	4.50	5.00	4.75	Very feasible	0.938	High
Overall	**4.33**	**4.78**	**4.56**	**Very feasible**	**0.889**	**High**

Source: research data (2026).

At the item level, three media items showed only moderate agreement (V = 0.750) because both validators rated them as good rather than very good: the choice of colours, the cover design, and the creativity and attractiveness of the design for senior high school students (Table 8). V3 offered no suggestions and judged the module feasible without revision. V4 judged it feasible with minor revisions and recommended adding QR codes linked to learning videos or supporting materials to make the module more interactive, and redesigning the cover with a more dominant title and an illustration that reflects the content of the module.

Table 8. Media Items with Moderate Agreement

No	Item	V3	V4	Mean	Aiken's V
4	The choice of colours is appropriate and does not hinder readability.	4	4	4.00	0.750
7	The cover design is attractive and reflects the content of the module.	4	4	4.00	0.750
10	The design of the module and worksheets is creative and attractive for senior high school students.	4	4	4.00	0.750

Source: research data (2026).

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

Revision to Prototype III

Based on the ratings and comments, the module was revised into Prototype III, as summarised in Table 9. The revisions concentrated on the visual and interactive qualities of the product, which were the areas identified by the media validators, and on the integration of STREAM, which was the lowest-rated aspect for the subject-matter validators.

Table 9. Revisions from Prototype II to Prototype III

No	Basis	Revision
1	V4's suggestion; cover design item (V = 0.750)	The cover was redesigned with a more dominant title and an illustration that reflects the content of the module.
2	V4's suggestion on interactivity	QR codes linking to learning videos and supporting materials were added to the module and worksheets.
3	Colour and design creativity items (V = 0.750)	The colour palette was revised for readability and the visual elements of the module and worksheets were enriched.
4	STREAM integration as the lowest-rated subject-matter aspect	The analytical function of each STREAM element in the core activities was made more explicit.

DISCUSSION

The first research question concerned the topics that lend themselves to STREAM integration. The mapping shows that STREAM can be integrated into Phase E sociology not by adding activities from other subjects, but by assigning each element an analytical function within sociological inquiry. This addresses a criticism raised in the STEAM literature, namely that integrated disciplines are often defined inconsistently and that added components are used superficially or merely to make lessons more attractive (Mejias et al., 2021; Perignat & Katz-Buonincontro, 2019). By defining science as evidence-based social inquiry, reading as critical reading, and mathematics as the quantification of social phenomena, the module makes each element necessary for answering a sociological question. The adoption of the reading-based definition (Grancharova, 2026; Ho et al., 2021) also distinguishes this study from Indonesian

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

STREAM studies that interpret R as religion (Aprillia & Hutahaean, 2026; Azizah et al., 2021). In sociology, reading has a direct disciplinary role, because distinguishing facts from opinions and judging the credibility of sources are part of the empirical attitude the subject aims to cultivate, and they correspond closely to the critical literacy needed to counter misinformation (Adnan et al., 2025).

Organising the topics around FoMO, group-chat conflict, and role conflict turns phenomena that research has documented among adolescents into learning content (Borualogo et al., 2025; Rahmania et al., 2025; Tandon et al., 2021). This responds to the gap between the expectations of the curriculum and the memorisation-oriented practice that still characterises many sociology lessons (Djunadi, 2015; Salsabila et al., 2025). It also extends earlier sociology development work on the sociological imagination and project-based learning (Pratiwi & Hidayah, 2016; Septiandini et al., 2024) by adding an explicit framework for interdisciplinary analysis. Compared with STEAM work in social studies, which has been mostly conceptual or focused on primary education (Riviani et al., 2026; Salamah & Susapti, 2025), the present study provides a concrete, validated design for senior high school sociology.

A further contribution concerns the tension between the non-ethical character of sociology and the normative products that the module asks students to design, such as a guide for filtering information before sharing it and a code of conduct for group chats. Rather than leaving this tension implicit, the design separates an analysis stage, in which phenomena are explained without moral judgment, from a solution-design stage based on values agreed upon by the class. This separation turns a potential contradiction into a learning point: sociology explains why something happens, while students as citizens act on shared values. The approach is consistent with the meaningful principle of the deep learning approach and with the competencies emphasised in education for sustainable development (Kementerian Pendidikan Dasar dan Menengah, 2025b; UNESCO, 2017).

The second research question concerned feasibility. Both expert panels rated the module very feasible with high agreement, which is in line with other Indonesian development studies that report high expert validity for STREAM and project-based materials (Aprillia & Hutahaean, 2026; Azizah et al., 2021; Razinsyah et al., 2025). The pattern of lower scores is, however, more informative than the high overall means. Among the subject-matter aspects, STREAM integration received the lowest mean, which suggests that integration remains the most demanding part of the design, as the STEAM literature would predict (Mejias et al., 2021; Perignat & Katz-

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

Buonincontro, 2019). On the media side, the cover, colour choices, and design creativity received the lowest agreement, and the suggestion to add QR codes points to the value of multimodal resources for engagement. The revisions in Prototype III respond directly to these findings.

The formative revision process also yielded design knowledge. Replacing learning-style grouping with differentiation by readiness, interest, and learning profile aligns the module with evidence on differentiation (Newton & Salvi, 2020; Tomlinson, 2017). Adding provisions for anonymous polling, fictional cases, voluntary sharing, and referral to school counsellors reflects the fact that issue-based sociology draws on students' personal experiences, which makes safeguarding a design requirement rather than an afterthought. Conducting an internal formative review before expert validation proved useful for detecting inconsistencies and gaps, but it was kept separate from the formal evaluation so that the feasibility judgment rests entirely on human experts.

Future research should address several methodological considerations to build upon these initial findings. First, because each instrument in this study was evaluated by only two validators, future studies should involve a larger panel of experts to provide more granular item-level validation data and avoid potential ceiling effects in ratings. Second, researchers should pre-test the validation instruments for content validity before deployment. Finally, because expert judgment only establishes a product's structural validity rather than its real-world utility (Plomp & Nieveen, 2013), the next critical phase must move beyond expert review. In line with formative evaluation models (Tessmer, 1993), the immediate next stage of this research will implement Prototype III with a small group of senior high school students to test its practicality, followed by a field test to evaluate its classroom effectiveness.

CONCLUSION

This study mapped Phase E sociology topics with potential for STREAM integration and developed and evaluated a teaching module based on contemporary social issues. In answer to the first research question, three topics were identified: sociology as a science, framed around FoMO and adolescent lifestyles on social media; social interaction, framed around communication and conflict in digital and face-to-face settings; and status and role, framed around role conflict and online self-presentation. In each topic, the six STREAM elements were assigned analytical functions and linked to relevant Sustainable Development Goals. In answer to the second research question, the module was rated very feasible by subject-matter and

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

language experts (M = 4.81; V = 0.952) and media experts (M = 4.56; V = 0.889), with the graphic design and the depth of STREAM integration identified as the main areas for improvement and addressed in Prototype III.

In practice, the module offers sociology teachers a ready-to-use design in which STREAM elements serve as tools of sociological analysis, learning follows the deep learning approach, and analysis without moral judgment is clearly separated from the design of value-based solutions. Theoretically, the study contributes operational definitions of STREAM for sociology and a design principle for reconciling the non-ethical character of the discipline with action-oriented learning. The study is limited by the small number of validators, uniformly high ratings, the absence of a separate content-validity test of the instruments, and the restriction of the evaluation to expert judgment. Further research should implement Prototype III with a small group of senior high school students to examine its practicality, test its effectiveness in regular classrooms, and extend the framework to other sociology topics and phases.

ACKNOWLEDGMENT

This research was funded by the Faculty Basic Research scheme of the Faculty of Social Sciences and Law, Universitas Negeri Jakarta, in 2026. The authors thank the expert validators for their assessments and comments.

REFERENCES

Adnan, A. Z., Ananta, Z., Nayla, A., Pardede, F. Z., Harianja, R., Prasasti, T. I., & Sembiring, S. U. B. (2025). Integrasi literasi kritis dan deteksi hoax dalam pembelajaran digital. *Jurnal Pendidikan Bahasa dan Sastra, 25*(2), 188–197. https://doi.org/10.17509/bs_jpbsp.v25i2.91072

Aiken, L. R. (1985). Three coefficients for analyzing the reliability and validity of ratings. *Educational and Psychological Measurement, 45*(1), 131–142. https://doi.org/10.1177/0013164485451012

Alanazi, F. H., & Al-Zahrani, E. (2025). Examination of teachers' self-effectiveness toward teaching integrated science, technology, reading, engineering, art, and mathematics: A cross-sectional study. *EURASIA Journal of Mathematics, Science and Technology Education, 21*(3), Article em2606. https://doi.org/10.29333/ejmste/16071

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

Anderson, T., & Shattuck, J. (2012). Design-based research: A decade of progress in education research? *Educational Researcher, 41*(1), 16–25. https://doi.org/10.3102/0013189X11428813

Aprillia, P., & Hutahaean, J. (2026). Development of STREAM-based student worksheets for teaching fluid dynamics at SMAN 14 Medan. *Jurnal Pendidikan, Sains, Geologi, dan Geofisika (GeoScienceEd Journal), 7*(3). https://doi.org/10.29303/goescienceed.v7i3.2608

Azizah, W. A., Sarwi, S., & Ellianawati, E. (2021). Development of STREAM-based teaching materials in training students' process skills through science project activities. In *Proceedings of the 6th International Conference on Science, Education and Technology (ISET 2020)* (pp. 147–156). Atlantis Press. https://doi.org/10.2991/assehr.k.211125.029

Belbase, S., Mainali, B. R., Kasemsukpipat, W., Tairab, H., Gochoo, M., & Jarrah, A. (2022). At the dawn of science, technology, engineering, arts, and mathematics (STEAM) education: Prospects, priorities, processes, and problems. *International Journal of Mathematical Education in Science and Technology, 53*(11), 2919–2955. https://doi.org/10.1080/0020739X.2021.1922943

Borualogo, I. S., Mubarak, A., & Dwarawati, D. (2025). From stress to screens: How internet use, loneliness, and social media habits relate to cyberbullying perpetration. *Jurnal Psikologi, 52*(2), 179–194. https://doi.org/10.22146/jpsi.98607

Cela-Ranilla, J., Esteve-Mon, F. M., & Sánchez-Caballé, A. (2025). Design-based research in higher education: A systematic literature review between 2019 and 2023. *Australasian Journal of Educational Technology, 41*(4), 67–83. https://doi.org/10.14742/ajet.10380

Djunadi, D. I. (2015). Efektivitas penerapan metode active debate dalam pembelajaran sosiologi. *Dimensia: Jurnal Kajian Sosiologi, 4*(1). https://doi.org/10.21831/dimensia.v4i1.3428

Easterday, M. W., Rees Lewis, D. G., & Gerber, E. M. (2018). The logic of design research. *Learning: Research and Practice, 4*(2), 131–160. https://doi.org/10.1080/23735082.2017.1286367

Fullan, M., Quinn, J., & McEachen, J. (2018). *Deep learning: Engage the world, change the world*. Corwin.

Goffman, E. (1959). *The presentation of self in everyday life*. Doubleday.

Goode, W. J. (1960). A theory of role strain. *American Sociological Review, 25*(4), 483–496. https://doi.org/10.2307/2092933

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

Grancharova, D. (2026). Fostering language and literacy through STREAM education: Integrating reading into interdisciplinary learning. *Foreign Language Learning, 53*(2), 216–224. https://doi.org/10.53656/for2026-02-04

Ho, T. T. N., Sivapalan, S., & Pham, H. H. (2021). The transformation from STEM to STREAM education at engineering and technology institutions of higher education. *SHS Web of Conferences, 124*, Article 07003. https://doi.org/10.1051/shsconf/202112407003

Kementerian Pendidikan Dasar dan Menengah. (2025a). *Keputusan Kepala Badan Standar, Kurikulum, dan Asesmen Pendidikan Nomor 046/H/KR/2025 tentang capaian pembelajaran pada pendidikan anak usia dini, jenjang pendidikan dasar, dan jenjang pendidikan menengah*.

Kementerian Pendidikan Dasar dan Menengah. (2025b). *Naskah akademik pembelajaran mendalam: Menuju pendidikan bermutu untuk semua*.

Lestari, W. F., Rakhmawati, A., & Sumarlam. (2026). Peran technological pedagogical content knowledge (TPACK) terhadap ketercapaian tiga prinsip pembelajaran mendalam (mindful, meaningful, joyful) pada siswa SMP. *Didaktika: Jurnal Kependidikan, 15*(1), 965–976. https://doi.org/10.58230/27454312.3667

McKenney, S., & Reeves, T. C. (2019). *Conducting educational design research* (2nd ed.). Routledge.

Mejias, S., Thompson, N., Sedas, R. M., Rosin, M., Soep, E., Peppler, K., Roche, J., Wong, J., Hurley, M., Bell, P., & Bevan, B. (2021). The trouble with STEAM and why we use it anyway. *Science Education, 105*(2), 209–231. https://doi.org/10.1002/sce.21605

Newton, P. M., & Salvi, A. (2020). How common is belief in the learning styles neuromyth, and does it matter? A pragmatic systematic review. *Frontiers in Education, 5*, Article 602451. https://doi.org/10.3389/feduc.2020.602451

Perales, F. J., & Aróstegui, J. L. (2024). The STEAM approach: Implementation and educational, social and economic consequences. *Arts Education Policy Review, 125*, 59–67. https://doi.org/10.1080/10632913.2021.1974997

Perignat, E., & Katz-Buonincontro, J. (2019). STEAM in practice and research: An integrative literature review. *Thinking Skills and Creativity, 31*. https://doi.org/10.1016/j.tsc.2018.10.002

Plomp, T., & Nieveen, N. (Eds.). (2013). *Educational design research: An introduction*. Netherlands Institute for Curriculum Development (SLO).

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

Pratiwi, P. H., & Hidayah, N. (2016). Pengembangan perangkat pembelajaran sosiologi dengan imajinasi sosiologi. *Jurnal Kependidikan: Penelitian Inovasi Pembelajaran, 46*(1), 56–68. https://doi.org/10.21831/jk.v46i1.9575

Przybylski, A. K., Murayama, K., DeHaan, C. R., & Gladwell, V. (2013). Motivational, emotional, and behavioral correlates of fear of missing out. *Computers in Human Behavior, 29*(4), 1841–1848. https://doi.org/10.1016/j.chb.2013.02.014

Rahmania, F. A., Anisa, S. N., & Zhafira, A. (2025). Dinamika cyberbullying pada remaja Indonesia: Tinjauan literatur naratif. *Batanang: Jurnal Psikologi, 4*(2), 86–101. https://doi.org/10.31958/jp.v4i2.16417

Razinsyah, M., Fitriani, V., & Sari, L. Y. (2025). Pengembangan e-modul berbasis project based learning pada materi inovasi teknologi biologi untuk fase E SMA/MA. *Indonesian Research Journal on Education, 5*(1), 744–748.

Retnawati, H. (2016). Proving content validity of self-regulated learning scale (The comparison of Aiken index and expanded Gregory index). *Research and Evaluation in Education, 2*(2), 155–164. https://doi.org/10.21831/reid.v2i2.11029

Riviani, S. W., Pratama, B., & Habibullah. (2026). Pendekatan STEAM berbasis kearifan lokal dalam pembelajaran IPS untuk meningkatkan kemampuan pemecahan masalah sosial siswa SMP. *Kaganga: Jurnal Pendidikan Sejarah dan Riset Sosial Humaniora, 9*(3). https://doi.org/10.31539/tjyd6k72

Ruslan, S. A., Wiryany, D., & Tawaqal, R. S. (2025). Personal branding construction on Gen Z Instagram: Differences in self-presentation on Gen Z's first and second accounts. *Journal of Digital Media Communication, 4*(1), 24–32. http://doi.org/10.35760/dimedcom.2025.v4i1.14770

Salamah, I., & Susapti, P. (2025). STEAM berbasis budaya lokal dalam pembelajaran ilmu sosial: Inovasi kreatif untuk siswa MI. *Al Ibtida': Jurnal Program Studi Pendidikan Guru Madrasah Ibtidaiyah, 13*(2).

Salsabila, A. R., Kuntari, S., & Setiawan, R. (2025). Implementasi pembelajaran sosiologi dalam mengembangkan sikap sosial pada siswa kelas X di SMA Negeri 2 Kota Serang. *Jurnal Pendidikan Tambusai, 9*(3), 37013–37017. https://doi.org/10.31004/jptam.v9i3.34328

Septiandini, D., Suyuti, S., Arriany, I., & Martina, T. (2024). Implementasi project based learning (PJBL) dalam kerangka Kurikulum Merdeka pada pembelajaran sosiologi. *Jurnal Ilmiah Wahana Pendidikan, 10*(8), 1128–1133. https://doi.org/10.5281/zenodo.11177530

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

Tandon, A., Dhir, A., Almugren, I., AlNemer, G. N., & Mäntymäki, M. (2021). Fear of missing out (FoMO) among social media users: A systematic literature review, synthesis and framework for future research. *Internet Research, 31*(3), 782–821. https://doi.org/10.1108/INTR-11-2019-0455

Tessmer, M. (1993). *Planning and conducting formative evaluations: Improving the quality of education and training*. Kogan Page.

Tomlinson, C. A. (2017). *How to differentiate instruction in academically diverse classrooms* (3rd ed.). ASCD.

UNESCO. (2017). *Education for sustainable development goals: Learning objectives*. UNESCO.

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License