

SLR: Discovering STEAM Integrated Science Disciplines for Learning Planning for Primary School Students in Indonesia Towards the Era of Society 5.0

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ABSTRACT

This research aims to find elements related to STEAM from 100 Google Scholar indexed articles resulting from scientific research. Elements related to STEAM can be implemented in elementary school students in facing the era of society 5.0. The method used in this research is the SLR (Literature Review System) PCR model (Planning, Conducting, Reporting) with the aim of systematically reviewing the literature to find elements related to STEAM based on research results from the last 7 years (2017-2024). The research results showed that other elements were compared with STEAM, such as language, social sciences, economics, religion, culture and literacy with the terms STREAM, SELAMeT, STREAME, STELAM and STEAMS and were even used as a basis for curriculum development such as in South Korea with the term WS-STEAM. Based on these findings, there are elements that can be used as a reference in developing learning plans in elementary schools towards the era of society 5.0 which are in accordance with the national basic education curriculum, especially in elementary schools in Indonesia, namely language, social (including culture and economics in social science learning), religion, and literacy.

Keywords: Elementary School, PCR (Planning, Conducting, Reporting), SLR (System Literature Review), STEAM

INTRODUCTION

A super intelligent society is a concept of society first proposed by Japan with a human center to balance solutions to social problems and economic progress through an integrated system between cyberspace and the physical world, known as society 5.0. These guidelines and demands became the starting point for the creation of learning models that require students to take part in this era so that learning should be student-centered as is currently being done, one of which is learning involving STEAM elements. This learning is an educational innovation to answer the challenges of the industrial



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revolution era 5.0, but is this learning (STEAM) able to overcome social phenomena that exist today or in the 4.0 era? In response to this, teachers are required to be creative in packaging learning so that it is fun and meaningful and able to enable each individual to solve problems with the skills they possess, both hard skills and soft skills, as competencies needed in the 21st century, including the ability to think critically, the ability to be creative, the ability to cooperation, and communication skills in solving various problems in life including environmental, social and moral problems.

The emergence of STEAM learning as a learning approach in Indonesia was inspired by America which was concerned that the quality of human resources was inadequate in the fields of science, technology, engineering and mathematics. STEAM learning is an innovative learning approach because it is considered cutting-edge in the industrial era 4.0. which is able to support 4 (four) basic skills such as critical thinking, creativity, communication and collaboration. Indonesia, based on various positive research on STEAM, is starting to integrate STEAM into learning pedagogy. Science (science), mathematics, and technology are cultural achievements that reflect society's humanity, economic strength, and are fundamental aspects of our lives as citizens, workers, consumers, and parents (National Research Council of The National Academies, 2011).

Current and future jobs require understanding and skills in the STEAM field. Starting from understanding medical diagnoses, evaluating lifestyle and environmental developments to managing daily activities with various computer-based applications. The trend of people's lives is developing towards a higher level of STEAM. Macquarie University, ranked 9 (nine) best university in Australia and 5 (five) star winner from the QS World University Ranking, mapped the study programs and jobs that are most needed in 2020. These jobs include those in the fields of information engineering, accounting, business, mathematics, health sciences, psychology, communication design, media, engineering, law, and teachers (Harususilo, 2018).

Indonesia must carry out structural transformation to respond to this mapping, especially in developing STEAM skills in its people. As Indonesia had done until 2010, namely switching from the agricultural sector to the service sector (International Labor Organization, 2012). The challenges of the world of work that require quality human resources in the STEAM field are one of the reasons for researchers, teaching staff, and the Indonesian ministry of education to integrate STEAM into learning. In this case, we can explore how STEAM is an innovative learning approach that can be integrated into relevant learning models such as problem based learning, discovery learning, and based on local wisdom such as the pangngadakkang tupanrita learning model from the Makassar tribe, South Sulawesi which connects social phenomena, digital literacy, and solutions to social problems in learning with the STEAMSs concept (adding social study elements to STEAM) in learning (Rafiuddin, Asri, Suwarjo, Megawati, Puspitasari, & Harefa, 2024).

STEAM (Science, Technology, Engineering, Arts, and Mathematics) learning is an integration of various scientific disciplines, namely science, technology, engineering, arts and mathematics which are in one unified learning approach. STEAM is the integration of arts disciplines into the curriculum and learning in the areas of science, technology, engineering and mathematics which were previously known as STEM. STEAM is a meta-discipline that integrates science, technology, engineering, arts and mathematics into an integrated approach that can be implemented in learning at school. STEAM was born and emerged after the addition of art disciplines that were integrated into STEM (Buiniconro, 2017). Towards a super intelligent society requires meta-disciplines that integrate not only STEM or STEAMS but other disciplines, especially social sciences, are also very important to integrate because this is a challenge for the world of work in the future. The

coming generation is not only capable in terms of knowledge, but having reliable skills and good behavior is the key to success. The transition of education in elementary schools from society 4.0 to society 5.0 requires a bridge to have academic abilities, competent skills and wise behavior which can be illustrated as follows:

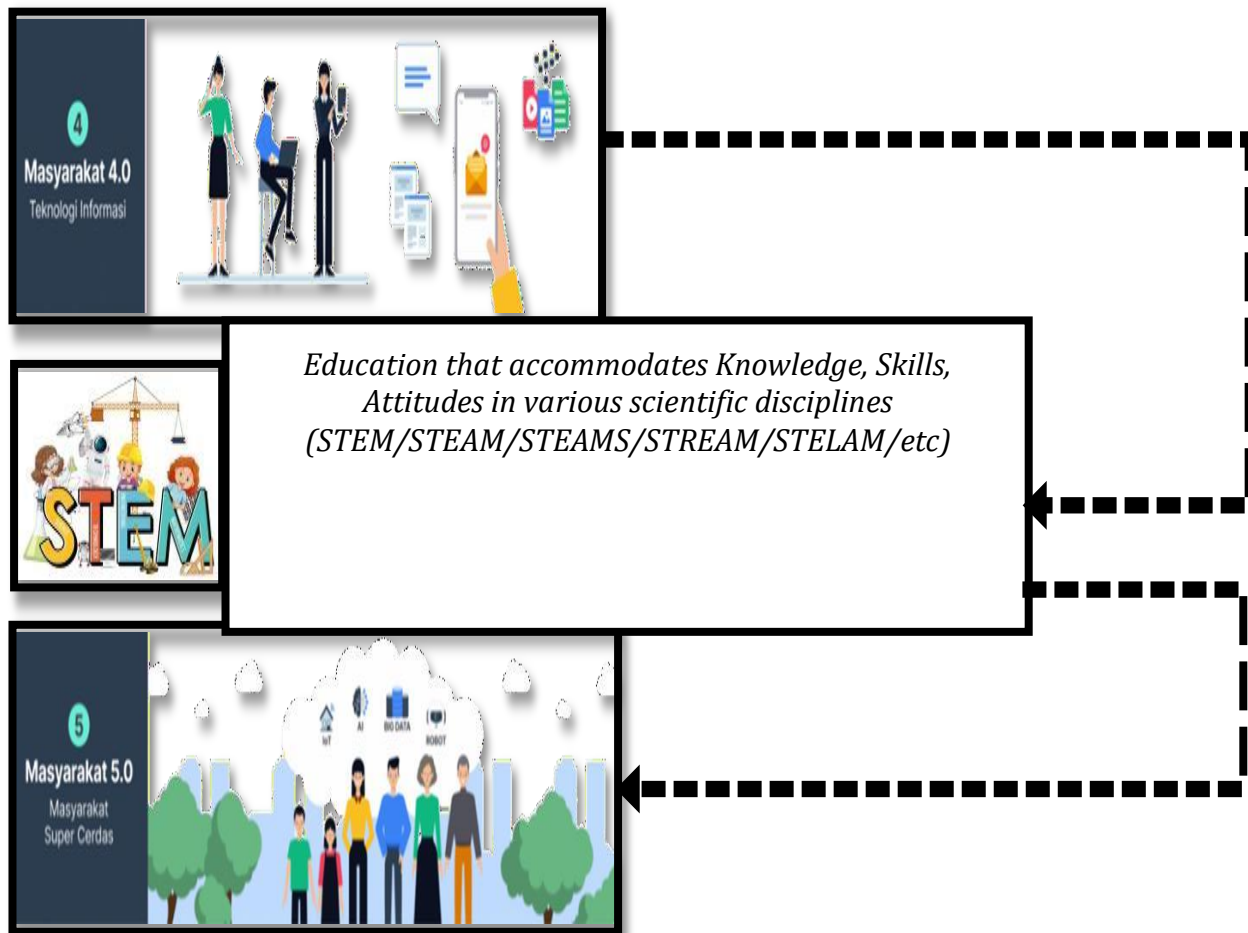


Figure 1. Transitional education from-to society 4.0-5.0
(Source: personal documents)

STEAM learning is currently one solution to overcome this, students have high-level thinking skills along with technology that can be seen from reading, writing, observing and doing science so that they can be used as provisions for living in society and solving problems faced in everyday life. related to the field of STEAM science. The STEAM approach to learning is expected to be able to provide meaningful learning innovations for students through systematic integration of knowledge, concepts and skills. Students can explore nature and social phenomena and can improve knowledge, skills and attitudes. This allows students to think critically, behave wisely in applying knowledge and skills related to science, technology, engineering, mathematics and social sciences, as well as other scientific disciplines. The STEAM approach can integrate science, technology, engineering and mathematics skills, as well as social phenomena focused on authentic problems so that students are able to reflect on the problem-solving process. Conventional learning only prepares students to continue higher studies, not preparing human resources who are critical, sensitive to the environment, creative, and understand simple technology that is present in society. In implementing the STEAM approach teachers are required to provide learning that is able to develop 21st century abilities in

students. Thus, the author wants to discuss STEAM as an approach to learning that is able to develop 21st century abilities (Davidi, Sennen, & Supardi, 2019). So what other elements related to STEAM can be used as learning planning for elementary school students in Indonesia in the era of society 5.0? This is the focus of study in this research. This article was produced from narrating previously existing ideas related to STEAM, to find scientific disciplines that can be integrated into elementary school students' learning planning in the era of society 5.0 apart from the scientific disciplines that are currently integrated in STEAM. This is to help elementary school students as early as possible be ready to face life's challenges and think of the best solutions to face them.

METHODE

This research is an SLR (system literature review) PCR (planning, conducting, reporting) model research. The planning stage is carried out through the process of searching and extracting literature, the conducting stage through the implementation stage with guidance on studying contemporary issues, choosing to solve problems, conducting literature, analyzing literature critically (critical analysis, taxonomy, new ways of thinking, metatheory), and the reporting stage is by publishing the SLR results (Torraco, 2005; & Wahono, 2015). SLR is the second study that combines findings from various primary studies to answer research questions (Newman & Gough, 2020, pp. 3-22). This research adapts the research process of Ardwiyaniti, Prasetyo, & Wilujeng (2021), namely: (1) formulating research questions; (2) establish inclusion criteria; (3) search for data-based articles on Google Scholar by typing the keywords "STEM" and "Education"; (4) coding articles using the Paper Classification Form (PCF); (5) identify patterns across articles; (6) synthesize these patterns to answer research questions. The filter stage resulted in 100 articles that met the inclusion criteria. The coding instrument resulting from the adaptation of the PCF developed by Kızılaslan, Sozibilir, & Yazar (2012) has met the requirements for validity and reliability. The collected data was analyzed using percentage calculations. Based on the inclusion criteria, the data obtained.

Table 1. Inclusion criteria

Category	Inclusion Criteria
Publication type	Scientific articles published in https://scholar.google.com
Journal specifications	Top international journals and national journals for the last 7 years
Journal index	Google Scholar, SINTA 1-6, Scopus Q1-NonQ, and GARUDA, Crossref, and ICI
Publication Year	2017-2024
Research country	Indonesian and Foreign
Variable	STEAM and integration of other scientific disciplines
Field	Science, Social, and general
Type of study	Theoretical and empirical
Keywords	STEAM, primary school & education (in Indonesian and English)
Subject	Students & teachers at all levels (kindergarten until college) and general

Source: processed by researchers

RESULTS AND DISCUSSION

STEAM research is based on a literature study of 100 articles on the Google Scholar website via the link <https://scolar.google.com> with the provisions of articles published in the last 7 years (2017-2024) which occupy the top position when searching with the keywords STEM/STEAM, elementary school, and education (in Indonesian and English) found 86 articles in journal publications and 14 articles in publications The results of proceedings from various countries and from various regions in Indonesia can be seen as follows:



Based on the results of the article search, 24 international articles and 76 national articles will be used as a review in this research, including: 1) the number of international articles from various countries, namely from Indonesia, 10 articles (coming from the region/province/regency/city, namely Lampung 1, Jakarta 2, Malang 1, Sukabumi 1, Surakarta 1, Ngawi 1, Palembang 1, Bali 1, and Bandung 1 article), Malaysia 3 articles, Uzbekistan 1 article, Rumania 1 article, Ukraine 1 article, Athens-Greece 1 article, Barcelona-Spain 2 articles, Seoul-Korea 3 articles, Finland 1 article, and Thailand 1 article; 2) the number of national articles from Indonesia, namely from the region/province/regency/city of Jakarta 5 articles, Surakarta 5 articles, Jambi 2 articles, Surabaya 5 articles, Bandung 7 articles, Lampung 2 articles, Semarang 13 articles, Tasikmalaya 2 articles, Mataram 2 articles, Banten 2 articles, Madura 3 articles, Pekanbaru 2 articles, Yogyakarta 3 articles, Sumenep 1 article, Singaraja 1 article, Pontianak 2 articles, Toraja 1 article, Sorong 1 article, Jember 2 articles, Blitar 2 articles, Bogor 1 article, Bengkulu 1 article, Aceh 1 article, Mojokerto 1 article, Cianjur 1 article, Kudus 1 article, Medan 1 article, Kediri 1 article, Cimahi 2 articles, Majalengka 1 article, Tegal 1 article, and Malang 1 article.

STEAM research distribution map based on research type, method and subject

As a result of this review, data was obtained regarding the type of research used in STEAM, namely theoretical and empirical research with quantitative, qualitative and mixed

research methods (R&D, CAR, & Mix method). The results of the article based on research methods are described as follows:

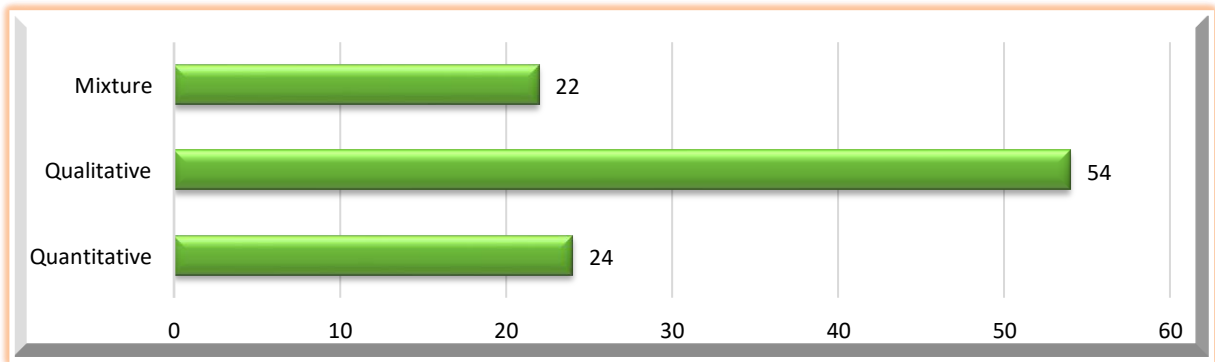


Figure 3. STEAM research methods
(Source: processed by researchers)

The research subjects from this review of 100 articles obtained data from all levels of education including kindergarten, elementary school, middle school, high school and higher education as well as teachers/lecturers and the general public which can be seen as follows:

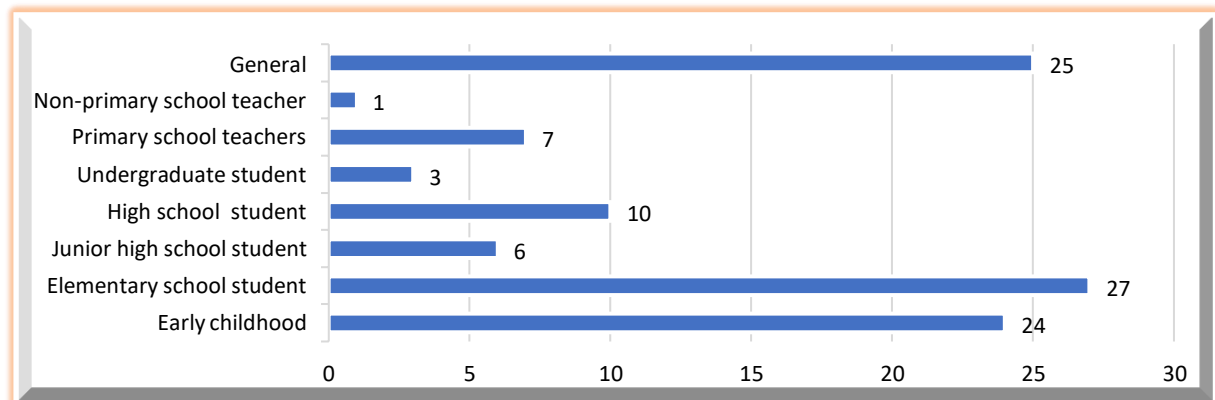


Figure 4. STEAM research subject
(processed by researchers)

The number of articles for elementary school students is 27 articles, for elementary school teachers 7 articles, for Early Childhood Education 21 articles, Middle School 6 articles, High School/Vocational High School 10 articles, non-Primary Teachers 1 article, Students 3 articles, and in general in education including a literature review of 25 articles.

STEAM research distribution map as independent variable

In research, STEAM is often used as an independent variable, either standing alone or as a variable that is connected to learning models, learning media, local wisdom, and is even seen as an approach, strategy or other labels. The following is an overview of STEAM as an independent variable in research based on the assumptions of the 100 articles reviewed, namely as follows:

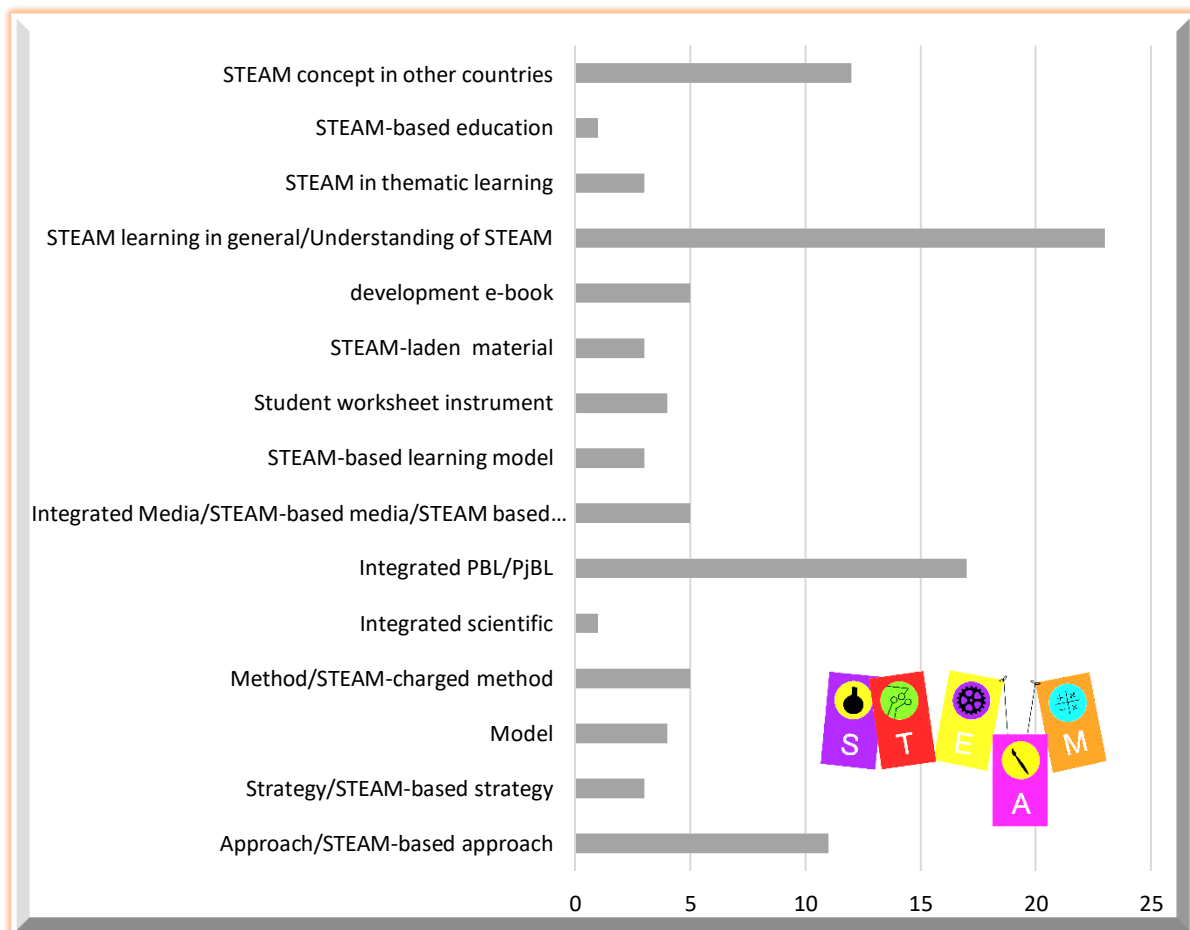


Figure 5. STEAM as the independent variable
(processed by researchers)

Various articles obtained views related to STEM/STEAM from different perspectives. 11 articles view STEM/STEAM as a STEM/STEAM-based approach/approach, 3 articles as a STEM/STEAM-based strategy/strategy, 4 articles as a model, 5 articles as a method/method containing STEM/STEAM, 1 article STEM/STEAM integrated with scientific, 17 articles on STEM/STEAM integrated with PBL/PjBL, 5 articles on STEM/STEAM integrated with STEM/STEAM-based media/STEAM-based applications, 3 articles on STEM/STEAM-based learning models, 4 articles on STEM/STEAM as an instrument Sheet Student Work, 3 articles containing STEM/STEAM in Distance Learning/Learning From Home, 5 articles on STEM/STEAM as the development of E-books/Modules/KITs, 23 articles discussing STEM/STEAM learning in general/perception/understanding of STEM/STEAM, 3 articles discussing STEM/STEAM in thematic learning, 1 article on STEM/STEAM-based education, and 12 articles about STEM/STEAM from various countries have different views regarding STEM/STEAM, the same as perceptions regarding STEM/STEAM in Indonesia with various names as approach, strategy, method, media, even as material.

Distribution map of the dependent variable connected to STEAM as the independent variable

STEAM in research as an independent variable is often linked to dependent variables such as skills, knowledge, attitudes and literacy, as well as 21st century skills, as well as industrial revolution 4.0 or other labels. The following is an overview of the dependent

variables related to STEAM in research based on the assumptions of the 100 articles reviewed, namely as follows:

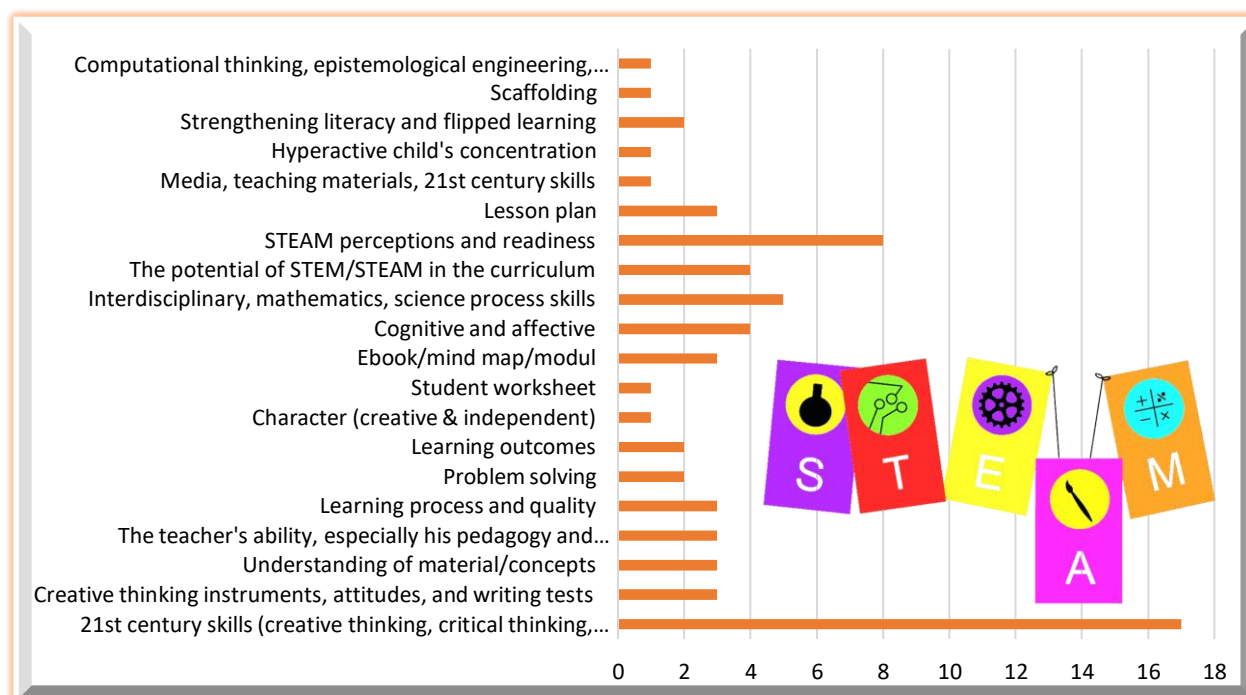


Figure 6. Dependent variable related to STEAM
(processed by researchers)

Various articles obtained views related to variable Y related to STEM/STEAM as variable concept, 3 articles relate to teacher abilities, especially pedagogy and professionalism, 3 articles relate to the process and quality of learning, 2 articles relate to problem solving, 2 articles relate to learning outcomes, 1 article relates to creative and independent character, 1 article relates to Sheet student work, 3 articles related to ebooks/mind maps/modules, 4 articles related to cognitive and affective, 5 articles related to interdisciplinary, mathematics, science process skills, 4 articles related to the potential of STEM/STEAM in the curriculum, 8 articles related to perception and STEAM readiness, 3 lesson plan articles, 1 media article, teaching materials, 21st century skills, 4 articles related to critical thinking (HOTS), 5 articles related to STEAM media, applications, digital platforms, 5 articles related to STEM/STEAM analysis, 2 articles related to revolution industry 4.0, 6 articles related to strengthening education, 1 article related to interactive learning, 6 articles related to 21st century skills, 1 article related to concentration of hyperactive children, 2 articles related to strengthening literacy and flipped learning, 1 article as scaffolding, and 1 articles related to computational thinking, epistemological techniques, computational science, and computational STEAM pedagogy (attached).

Discovery of new terms (disciplines) integrated/related to STEM/STEAM as well as predictions of renewal

Several schools or institutions have conducted research related to new scientific disciplines that can be integrated into learning and added the word STEAM with these new scientific disciplines, such as adding religious disciplines to become (STREAM), adding elements of literacy to become (SELaMeT), as well as convergence education. SW, software learning so that it becomes SW-STEAM like the results of STEM/STEAM articles which have new terms that have been developed currently, namely 2 articles with the

name STREAM which come from Semarang and Bandung, 1 article with the name SELAMeT which comes from Mojokerto, and 1 article with the name SW-STEAMS from Korea (Azizah, Sarwi, & Ellianawati, 2019; Agustina, Rustaman, Riandi, Purwianingsih, 2021; Rochanah, 2021; & Bae & Lee, 2020). STEAM development based on the results of a review of 100 articles can be seen as follows:

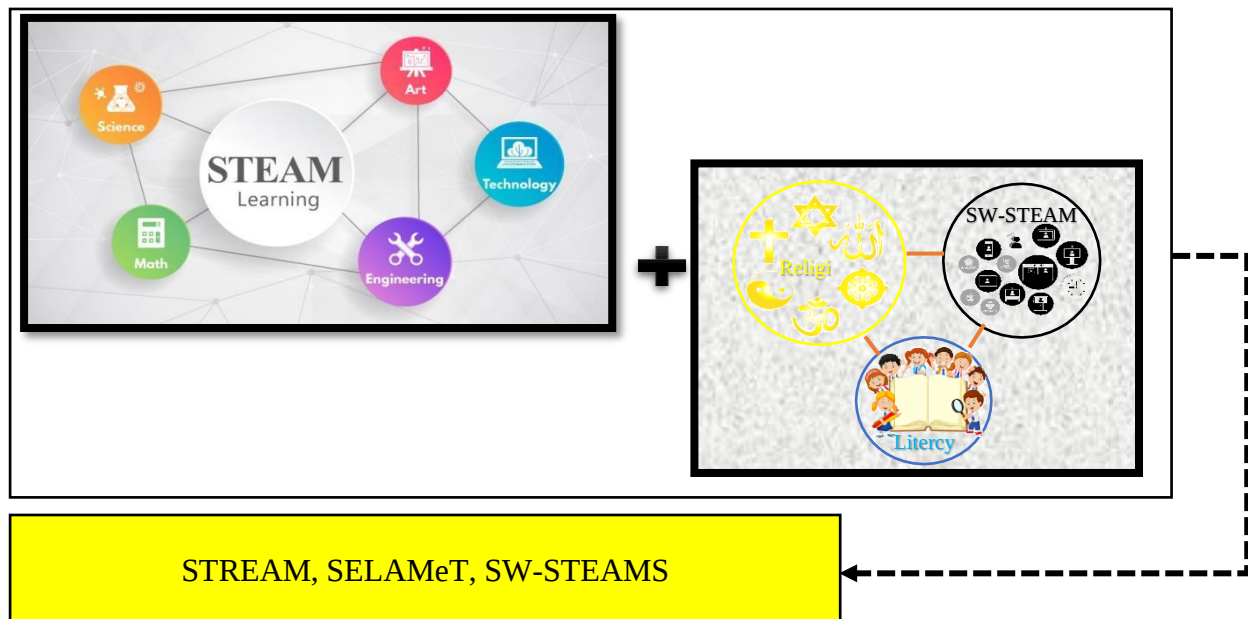


Figure 7. Integration of current scientific disciplines with STEAM
(processed by researchers)

The following is a discussion regarding STREAM, SELAMeT, and SW-STEAMS findings, namely: STREAM (addition of religious elements) The research results of Azizah, Sarwi, & Ellianawati (2019) showed that 59% of students' critical thinking ability test results or 17 students had not reached the actual completion limit (BTA), namely 73. So, there is a need to optimize the role of teachers and the use of an approach to improve students' critical thinking abilities. Based on this, the implementation of the STREAM approach is expected to improve students' critical thinking abilities. Increasing students' critical thinking skills can improve the quality of human resources, so that they can have competitiveness and have a Pancasila spirit in the era of disruption. In line with the research of Agustina, Rustaman, Riandi, Purwianingsih (2021), it is clear that student creativity is different for each Traditional Biotechnology content and is at the not yet evident and emerging level. The results of achieving the highest creativity score obtained by students were in the detailed thinking (elaboration) indicator with an emerging level and the lowest achievement was with a not yet evident level in the original thinking component (originality). STREAM-based learning can provide student creativity in Traditional Biotechnology content.

The next finding is SELAMeT (addition of Literacy elements). The conclusion from Rochanah's research (2021) shows that the charm of learning contains SELAMeT in increasing HOTS for early childhood where learning is in a playful, fun and interesting atmosphere for children. Psychologically, it is said to be successful in increasing HOTS because the teacher has facilitated several materials, to be explored through loose parts, the teacher has provided challenges with invitations through arranging materials, books, games in such a way so that children are interested, the teacher looks after the children so that the children are interested in learning more deeply through SELAMeT. Meanwhile, research from South Korea is SW-STEAM, where this country is developing SW-STEAM convergence education with three components which are the standard framework for

STEAM learning in South Korea, namely context presentation, creative design, and emotional touch in their curriculum (Korea Foundation for the Advancement of Science and Creativity, 2016; Bae & Lee, 2020).

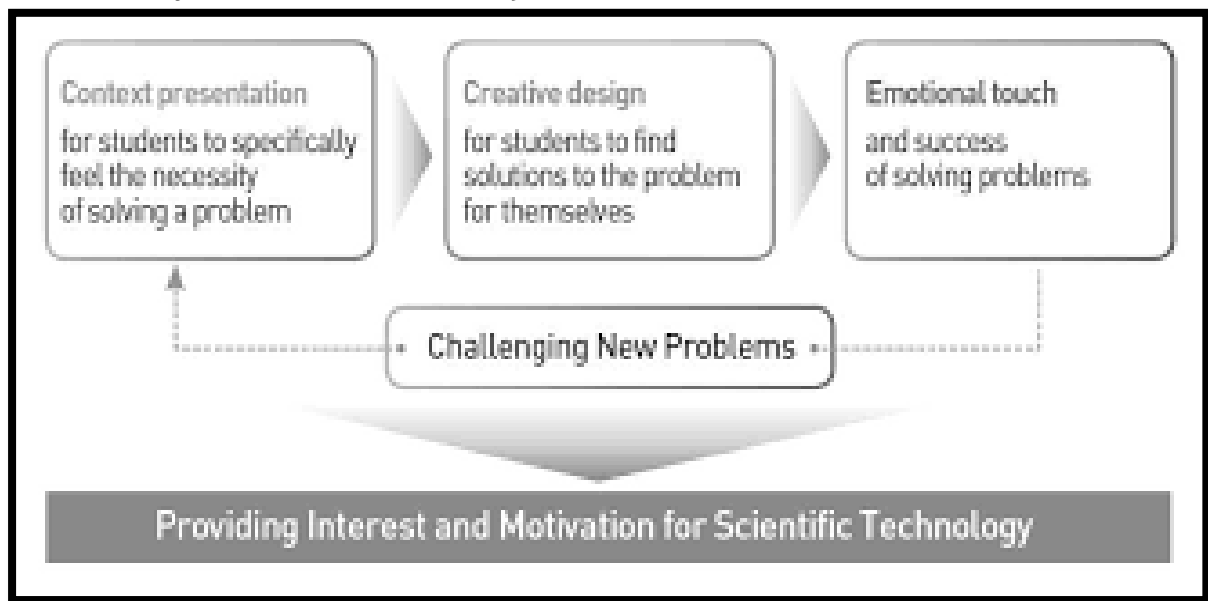


Figure 8. Learning standards framework STEAM in South Korea (KOFAC, 2016)

Context presentation is a step that shows the problem to be solved by connecting it to the real world so that students recognize the problem as their own and explain the situation to include the entire program; Creative design consists of the process of thinking and developing the best solution within various limitations that arise in real world problems. In this case, creative design in STEAM is close to the engineering field. The essence of this process is that when students look for solutions to existing problems, students can realize their ideas and express them actively through discussion. When students face more complex problems, students integrate the knowledge they have in various subjects. In group activities, students find clues to solutions through a collaborative process; and Emotional touch is an important element to increase student interest and motivation. If students successfully solve problems by recognizing a given problem, relating it to their own situation, and uncovering their own clues through creative design, then students will boost their ability to solve problems and gain the courage to take on new challenges. The effect of emotional touch increases only when the teacher helps students achieve continuous thinking and the desire to act. Emotional touch refers to experiences that enable a positive cycle of self-directed learning where students feel interest, confidence, intellectual satisfaction, and a sense of accomplishment, as they find motivation, passion, flow, and personal meaning in learning.

Based on the results of reviewing 100 articles about STEM/STEAM with the conditions explained previously, it was found that STEM/STEAM tends to focus on science, mathematics, although art, engineering and technology are also discussed in it which are suitable for designing future learning in elementary schools towards era of society 5.0. religious education, literacy have been found with the terms STREAM and SELAMeT but are still very lacking. Civics, language and social science education should be integrated with other scientific disciplines for learning design in elementary schools where in theory, learning is still holistic (Thorndike, 1911; Rafiuddin, Soesanto, Mulyana, & Martiningsih, 2019). The future challenges of the alpha generation towards the era of society 5.0 are not only from an intellectual perspective, but skills including social life and

personality including prosocial behavior are the main things that must be possessed in entering the world of work so that the readiness of the current alpha generation needs to be equipped early on towards a brighter future. brilliant because this competency is urgent both in social life and in the world of work. Based on this, several things can be developed in designing learning in elementary schools that require competencies that students must have in the future, namely integrating various scientific disciplines in learning such as STEAMs (science, technology, engineering, art, mathematics, and social studies) , STREAM (science, technology, religion, engineering, art, and mathematics), STELAM (science, technology, engineering, language, art, and mathematics), STELLAMs (science, technology, engineering, language, literacy, art, mathematics, and social studies), as well as STRELLAMs (science, technology, religion, engineering, literacy, language, art, mathematics, and social studies). This is also in accordance with the independent curriculum in elementary schools regarding learning content in the Minister of Education and Culture Regulation Number 21, 2016 concerning Primary and Secondary Education Content Standards. Predictions about the renewal of the integration of scientific disciplines with STEAM in designing learning in elementary schools in Indonesia towards the era of society 5.0 can be seen as follows:



Figure 9. Prediction of the recency of disciplinary integration with STEAM for elementary school students
(processed by researchers)

Even though STEAM learning is innovative learning, it is not free from the weaknesses and limitations that accompany it, especially when compared with other multidisciplinary or interdisciplinary sciences. This can be a limitation, but on the other hand it is a challenge that needs to be faced and anticipated. Because, there is no one approach or learning model that is suitable for all student characteristics. There are always pros and cons for academics and practitioners because of the different conditions and points of view they have. Challenges in learning STEAM with the integration of other knowledge can be differences in viewpoints regarding STEAM and how to apply it. There are three possibilities that can be done regarding different points of view regarding STEAM in implementing it in schools, namely: silo, embedded, and integrated. Although all three have advantages and disadvantages, this is a choice for teachers to implement in their respective schools depending on the needs and conditions of students (Juniaty, Zubaidah, & Supriyono, 2016).

The *silo* approach is an application that separates each STEAM field of study, allowing students to lack interest in one STEAM field. For example, women are less interested in participating in engineering than men. The focus of the silo approach is material content so that students master all the material. This can limit the amount of

cross-disciplinary stimulation and student understanding. For example, students know the concept of the laws of physics but are not good at solving problems that require integration of the laws of physics and other fields such as applied technology. Furthermore, the weakness of the embedded approach is that it can result in disjointed learning. If a student cannot relate the embedded material to the main material, the student could potentially only learn part of the lesson rather than benefit from the lesson as a whole. For example, students' learning process can be disrupted if students have not mastered the mathematical and technical knowledge embedded in the science field (as the main content), and the last is an integrated approach. The lack of standard standards for STEAM learning in Indonesia in the curriculum has resulted in its implementation being different for each school. Because there are no applicable or clear standards like the curriculum in South Korea regarding STEAM and schools focus on different topics, it is possible that some students are not ready enough to continue their studies at university. It is also very possible that the teacher teaching the students is not qualified to teach the subject matter. Therefore, the strategic step is how the STEAM approach is implemented in an integrative manner in elementary schools in Indonesia (Cooper, 2019).

CONCLUSIONS

STEAM research in Indonesia and several other countries including Malaysia, Korea, Finland, Spain, Greece, Ukraine, Uzbekistan, Rumania and Thailand is dominated by the topic of learning strategies using simple experimental methods. The most common integration pattern is STEAM-PjBL. 21st century skills are the dominant dependent variable associated with STEAM learning. Several issues have not been optimally explored, including STEAM teacher professional development programs; development of teaching materials; media; and a STEAM-based learning model with the help of artificial intelligence technology; a combination of local Indonesian wisdom concepts; and the connection with the Pancasila student profile (*profil pelajar Pancasila*) includes faith and devotion to the One God and noble character, global diversity, mutual cooperation, independence, creativity and critical thinking; as well as improving engineering-based skills for students such as computational thinking. Apart from that, STEAM research is suitable to be combined with the beliefs of religious communities in Indonesia, mastery of foreign languages, use of Indonesian and local languages of each elementary school student, and basic literacy including reading and writing literacy, numeracy literacy, scientific literacy, digital, financial literacy, as well as cultural and civic literacy.

STEAM that can be integrated into learning designs in elementary schools towards the era of society 5.0 includes STEAMS (science, technology, engineering, art, mathematics, and social study), STREAM (science, technology, religion, engineering, art, and mathematics), STEAM (science, technology, engineering, language, art, and mathematics), STELLAMSs (science, technology, engineering, language, literacy, art, mathematics, and social study), and STRELLAMSs (science, technology, religion, engineering, literacy, language, art, mathematics, and social studies). Several articles obtained integration with economics, e-commerce, but the consideration is still at the elementary school level and this is part of social studies so this is not used as integration in STEAM learning in elementary schools and this is also in accordance with the current independent curriculum implemented in Indonesia at the elementary school level.

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Appendix: Literature Review Results of STEAM Education Research in Elementary Schools

No.	Name and Research Institution	Research Objectives or Problems Methods, Subjects, Techniques, Instruments, Research Data Analysis Conclusion of Research Results	Article References from Literature
1	Septina Severina Lumbantobing & St. Fatimah Azzahra. 1,2) Universitas Kristen Indonesia, Jakarta, Indonesia	Research Objectives or Problems: Mendapatkan gambaran tentang peningkatan kemampuan berpikir kreatif siswa yang memperoleh pembelajaran IPA dengan STEAM (Science, Technology, Engineering, Arts and Mathematics). Penelitian ini dilaksanakan di Sekolah Menengah Pertama YWPM Jakarta semester 2020/2021. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Quasi eksperimen dengan desain penelitian menggunakan one group pretest posttest group design. Sampel dalam penelitian ini berjumlah 30 siswa kelas VIII. Instrumen yang digunakan adalah tes keterampilan berpikir kreatif materi pelajaran pesawat sederhana berupa tes uraian sebanyak 10 soal. Aspek keterampilan berpikir kreatif yang diukur terdiri dari aspek kefasihan, fleksibilitas, rasional dan elaborasi. Conclusion of Research Results: Kemampuan berpikir kreatif siswa meningkat 0,57 pada kategori sedang. Untuk 4 aspek kemampuan penalaran yang diteliti terjadi peningkatan aspek kefasihan sebesar 46%, aspek fleksibilitas sebesar 64%, aspek rasional sebesar 87% dan aspek elaborasi sebesar 78%	Lumbangtobing, S., S. & Azzahra, S., F. (2020). Meningkatkan Kemampuan Berpikir Kreatif Siswa dalam Menghadapi Revolusi Industri 4.0 Melalui Penerapan Pendekatan Steam (Science, Technology, Engineering, Arts And Mathematics). <i>Jurnal Dinamika Pendidikan</i> , 13(3), 393-400. DOI: https://doi.org/10.33541/jdp.v12i3.1295 http://ejournal.uki.ac.id/index.php/jdp
2	Ahmad Fadhlilah, Rochmiyati, & Lilik Sabdaningtyas. 1,2,3) University of Lampung, Bandar Lampung, Indonesia.	Research Objectives or Problems: Analyze the need for developing appropriate science, technology, engineering, arts and mathematics (STEAM) assessment instruments (valid, practical and effective) to improve students' creative thinking skills. The instruments that have been used in education units have not been fully able to encourage students to think at a higher level in building conceptual understanding and solving their own problems Methods, Subjects, Techniques, Instruments, Research Data Analysis: Qualitative descriptive study based on a literature review of the STEAM-based assessment instrument as an effort to improve students' creative thinking skills. The research subjects were educators and fourth grade students of SD Negeri 2 Tulusrejo, Pekalongan District, East Lampung. The research object was creative thinking ability, assessment instrument, and STEAM. The data collection instrument used an interview guide. Questionnaire. An assessment instrument needed to support the learning process in the education unit to improve students' creative thinking skills. Conclusion of Research Results: The finding indicated that educators had not fully used assessment instruments that could improve students' creative thinking skills. Besides, educators needed a STEAM-based assessment instrument that was appropriate to the level of the learner. Thus, it can be concluded that STEAM-based instruments to improve students' creative thinking skills in elementary schools must be developed.	Fadhlilah, A., Rochmiyati, Sabdaningtyas, L. (2021). STEAM class-based creative thinking ability instruments for elementary school. <i>International Journal of Educational Studies In Social Sciences</i> , 1(3), 121–123. DOI: https://doi.org/10.53402/ijess.v1i3.23
3	Khujiyarov Islam Abdumalikovich. Jizzax State Pedagogical Institute, Uzbekistan	Research Objectives or Problems: In this research work about the problems of the learning process mathematics for students in the STEAM education is investigated. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Qualitative descriptive Conclusion of Research Results: The STEAM technology of education allows creating in schoolchildren skills in conducting a laboratory experiment, understanding of fundamental scientific concepts and laws, ability to apply modern tools of activity, critical thinking and creativity.	Abdumalikovich, K., I. (2020). Peculiarities of organization of learning process in the context of STEAM education technology. <i>Scientific Progress: Ilmy Jurnal</i> , 48-56. http://www.scientificprogress.uz/
4	Mia Audiana & Rusnilawati Universitas Muhammadiyah Surakarta, Indonesia	Research Objectives or Problems: Kemampuan berpikir kritis matematika peserta kelas IV SD Negeri Trosemi 02 Gatak Sukoharjo telah berkembang dengan menerapkan cara STEAM pada model <i>Inquiry Learning</i> dengan bantuan <i>liveworksheets</i> Methods, Subjects, Techniques, Instruments, Research Data Analysis: PTK (perencanaan, tindakan, observasi, dan refleksi). Metode pemeriksaan informasi menggunakan penjelasan kuantitatif. Penelitian ini melibatkan 18 siswa kelas IV SD Negeri Trosemi 02 Gatak Sukoharjo Conclusion of Research Results: Siswa kelas IV SD Negeri Trosemi 02 Gatak Sukoharjo dapat meningkatkan kemampuannya dalam menyelesaikan masalah matematika dengan menggunakan pendekatan STEAM yang dipadukan dengan model <i>inquiry learning</i> dan <i>liveworksheets</i> .	Audiana, M., & Rusnilawati. (2024). Pendekatan STEAM dengan Model <i>Inquiry Learning</i> Berbantuan <i>Liveworksheet</i> untuk Meningkatkan Kemampuan Pemecahan Masalah Matematika Siswa Sekolah Dasar. <i>JURNAL BASICEDU</i> , 8(2), 1466 – 1473.
5	Yoonju Bae & Jeongmin Lee Ewha Womans University, Korea	Research Objectives or Problems: The purpose of this study is to synthesize and specifically analyze the effects of elementary SW-STEAM Education on learning outcomes by using meta-analysis. Methods, Subjects, Techniques, Instruments, Research Data Analysis: System literatur review: 29 papers are selected and total of 60 effect sizes are deduced. Total effect size is a medium effect of .35, which reveals significant effect on the cognitive and affective domains, and 8 moderator variables explain the difference in total effect sizes as well. Conclusion of Research Results: The results show that SW-STEAM education is effective for elementary students' learning outcomes. Practical implication for design and implementation are addressed.	Bee, Y. & Lee, J. (2020). Effects of SW-STEAM Education for Elementary School: A Meta-Analysis. <i>Journal of the Korea Contents Association</i> (한국콘텐츠학회논문지), 20(10), 247-258. DOI: https://doi.org/10.5392/JKCA.2020.20.1.0.247
6	Idam Ragil Widianto Atmojo, Roy Ardiansyah, Dwi Yuniasih Saputri, & Fadhlil Purnama Adi 1,2,3,4) Universitas Sebelas Maret, Indonesia	Research Objectives or Problems: Mendeskripsikan keefektifan media pembelajaran augmented reality (AR) berbasis STEAM dalam pembelajaran IPA di sekolah dasar. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Metode eksperimen. Subjek penelitian yang dilibatkan yaitu 6 sekolah dasar yang terdiri dari 3 sekolah dasar untuk kelas eksperimen (60 siswa) dan 3 sekolah dasar untuk kelas control (62 siswa). Jumlah guru yang terlibat yaitu 6 guru ke. Teknik pengumpulan data menggunakan tes soal pilihan ganda berjumlah 30 soal untuk siswa. Conclusion of Research Results: augmented reality berbasis STEAM efektif untuk meningkatkan kualitas pembelajaran IPA di SD. Hasil perhitungan uji-t menggunakan SPSS didapatkan t-tabel sebesar 2,874 > dari t table 1,980 (df-2= 122-2= 120). Hasil normalized gain menunjukkan adanya peningkatan yang signifikan sebelum dan sesudah menggunakan media augmented reality berbasis STEAM pada pembelajaran IPA di SD yaitu 0,72 yang termasuk dalam kategori tinggi.	Atmojo, I., R., Ardiansyah, R., Saputri, D., Y., & Adi, F., P. (2021). The Effectiveness of STEAM-Based Augmented Reality Media in Improving the Quality of Natural Science Learning in Elementary School. <i>Al-Ishlah: Jurnal Pendidikan</i> , 13(2), 821-828.

7 	Suci Utami Putri & Abdurrohaman Ahmad Taqiudin Pendidikan Guru Pendidikan Anak Usia Dini, Universitas Pendidikan Indonesia	Research Objectives or Problems: Mendeskripsikan proses STEAM-Project Based Learning (STEAM-PBL) serta mengidentifikasi perkembangan kemampuan pemecahan masalah selama kegiatan berlangsung. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Mixed method concurrent embedded design yang mengombinasikan data kualitatif berupa deskripsi aktivitas belajar dan data kuantitatif terkait kemampuan pemecahan masalah anak yang diperoleh dengan menggunakan lembar observasi. Partisipan yang terlibat adalah 14 anak usia 5-6 tahun di salah satu TK di Kabupaten Purwakarta yang diamati selama satu bulan kegiatan penelitian berlangsung. Data aktivitas belajar dianalisis secara deskriptif sedangkan data perkembangan kemampuan memecahkan masalah dianalisis dengan menghitung jumlah dan persentase anak yang masuk ke dalam kriteria perkembangan tertentu. Conclusion of Research Results: Pembelajaran STEAM-PBL di PAUD dilakukan melalui tahapan reflection, research, discovery, application dan communication. Sementara itu, kemampuan memecahkan masalah anak mengalami perkembangan yang semula pada umumnya berada pada kriteria “Belum berkembang” dan “Mulai Berkembang” meningkat menjadi “Berkembang Sesuai Harapan” dan “Berkembang Sangat Baik”.	Putri, S., C., & Taquiddin, A., A. (2022). STEAM-PBL: Strategi Pengembangan Kemampuan Memecahkan Masalah Anak Usia Dini. <i>Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini</i> , 6(2), 856-867. DOI: https://doi.org/10.31004/obsesi.v6i2.1270
8 	Elena Jurado, David Fonseca, Jorge Coderch, & Xavi Canaleta 1,2,4) GRETLE-Research Group on Technology Enhanced Learning, La Salle Campus Barcelona, Universitat Ramon Llull, 08022 Barcelona, Spain; 3) Department of Engineering, Blanquerna, Universitat Ramon Llull, 08022 Barcelona, Spain.	Research Objectives or Problems: Robotics is one of the key learnings in a world where learners will interact with multiple robotic technologies and operating systems throughout their lives. However, school teachers, especially in the elementary and primary education stages, often have difficulties incorporating these tools in the classroom. Four elementary teachers in three schools in Catalonia were trained to introduce robotics in the classroom to seventy-five students. Methods, Subjects, Techniques, Instruments, Research Data Analysis: The main actions consisted in classroom accompaniment by a university-trained support teacher, curricular materials' development, and assessment of the students' and teachers' learning. The designed contents and evaluation criteria took into account the potential of educational robotics to improve soft skills and to promote Science, Technology, Engineering, Arts, and Mathematics (STEAM) interdisciplinary learning. Teachers perceived the training to be supportive and useful and ended the school year feeling confident with the used robotic platform (KIBO). The assessment of the students' learning showed an average mark of 7.1–7.7 over 10 in the final evaluation criteria. Conclusion of Research Results: The assessment of the students' learning showed an average mark of 7.1–7.7 over 10 in the final evaluation criteria. Moreover, students' learning was higher in the classes where the teachers had higher initial interest in the training. We present and analyse the actions carried out, with a critical and constructive look at extending the experience to other educational centers.	Jurado, E., Fonseca, D., Coderch, J., & Canaleta, X. (2020). Social STEAM Learning at an Early Age with Robotic Platforms: A Case Study in Four Schools in Spain. <i>Sensors</i> , 20(3698), 1-21. DOI: http://doi.org/10.3390/s20133698
9 	Tri Hari Widodo, Rokhmaniyah, Muhammad Husni Arifin 1,3) Program Studi Pendidikan Dasar, Universitas Terbuka, 2) Program Studi Pendidikan Guru Sekolah Dasar, Universitas Sebelas Maret	Research Objectives or Problems: Pengaruh pembelajaran STEAM melalui Problem Based Learning terhadap hasil belajar siswa kelas IV pada mata pelajaran PKn di SD N 1 Kuwayuhan Kecamatan Pejagoan Kabupaten Kebumen. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Penelitian ini merupakan penelitian eksperimen. Populasi dan sampel dalam penelitian ini adalah 66 orang siswa. Pengumpulan data menggunakan observasi, wawancara, dan tes. Teknik analisis data dalam penelitian ini yaitu uji normalitas, uji homogenitas, dan uji hipotesis. Conclusion of Research Results: Hasil penelitian ini berupa: (1) Pelaksanaan Pembelajaran Berbasis STEAM melalui Problem Based Learning menggunakan langkah: Orientasi siswa pada masalah; Mengorganisasi siswa untuk belajar; Membimbing pengalaman individual/kelompok; Mengembangkan dan mempresentasikan artefak dan exhibit; Menganalisis dan mengevaluasi proses pemecahan masalah; (2) Rata rata hasil belajar siswa mengalami peningkatan, dari 87,27 menjadi 91,97. (3) Terdapat pengaruh Pembelajaran STEAM melalui Problem Based Learning terhadap Hasil Belajar Siswa, jal ini dibuktikan dengan Sig. < 0,05, atau Signifikansi nilai postes 0,017 < 0,05.	Widodo, T., H., Rokhmaniyah, & Arifin, M., H. (2021). Pengaruh Pembelajaran STEAM melalui Problem Based Learning terhadap Hasil Belajar Siswa Kelas IV pada Mata Pelajaran PKn di SDN 1 Kuwayuhan Kecamatan Pejagoan Kabupaten Kebumen. <i>Jurnal Pendidikan Tambusai</i> , 5(2), 3483-3489.
10 	Dina Amalia, Joko Sutarto, Yuli Kurniawati, & Sugiyo Pranoto Pendidikan Anak Usia Dini, Universitas Negeri Semarang, Indonesia	Research Objectives or Problems: Pandemi covid-19 berdampak pada bidang pendidikan. Pendidikan yang semula dengan metode tatap muka, kini diubah menjadi pembelajaran jarak jauh. Pembelajaran yang sesuai saat pembelajaran jarak jauh yaitu pembelajaran bermuatan STEAM. Karena muatan STEAM merupakan isu penting dalam pendidikan saat ini, sehingga karakter kreatif dan kemandirian anak dapat diintegrasikan melalui pembelajaran bermuatan STEAM. Tujuan penelitian ini untuk mengetahui pengaruh pembelajaran jarak jauh bermuatan STEAM terhadap karakter kreatif dan kemandirian anak di beberapa PAUD di Jawa Tengah. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Penelitian deskriptif kuantitatif dengan pendekatan survei. Conclusion of Research Results: Pembelajaran jarak jauh bermuatan STEAM yang merupakan keterbaruan dari hasil integrasi STEM dengan tambahan Art dapat berpengaruh terhadap karakter kreatif dan kemandirian. Berdasarkan pernyataan permasalahan penelitian, dirumuskan pertanyaan bagaimana pengaruh pembelajaran jarak jauh bermuatan STEAM terhadap karakter kreatif dan kemandirian anak. Dampak dari penelitian pembelajaran jarak jauh bermuatan STEAM berupa pengembangan sikap kreatif dan kemandirian yang dapat diaplikasikan dalam kegiatan sehari-hari.	Amalia, D., Sutarto, J., Kurniawati, Y., & Pranoto, S. (2022). Pengaruh Pembelajaran Jarak Jauh Bermuatan STEAM Terhadap Karakter Kreatif dan Kemandirian. <i>Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini</i> , 6(3), 1233-1246. DOI: https://doi.org/10.31004/obsesi.v6i3.1765
11 	Dena Sapna Sabillah Universitas Pendidikan Indonesia Kampus Tasikmalaya	Research Objectives or Problems: Penelitian ini merupakan penelitian pengembangan instrumen penilaian sikap pada pembelajaran STEM (Sains, Technology, Engineering, and Mathematics) dengan media perahu bertenaga uap di kelas V sekolah dasar untuk mendukung kurikulum 2013 dalam menghadapi tantangan globalisasi di kehidupan nyata. Penelitian ini dilatarbelakangi dengan beberapa sekolah yang belum mengembangkan instrumen penilaian sikap pada pembelajaran STEM. Selain itu, guru menilai sikap siswa tanpa menggunakan instrumen penilaian, sehingga guru cenderung menilai sikap siswa secara subjektif. Penelitian ini bertujuan untuk mengembangkan dan mendeskripsikan desain rancangan instrumen penilaian sikap yang dapat dilaksanakan pada pembelajaran STEM. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Tahapan penelitian menggunakan metode Educational Design Research (EDR). Penelitian ini menyajikan 2 tahap yaitu 1) Analysis and Exploration, penelitian pada fase awal penelitian desain pendidikan untuk menganalisis kebutuhan dan konteks masalah yang terdapat dilapangan; 2) Design and	Sabillah. (2021). Pengembangan instrumen penilaian sikap pada pembelajaran stem dengan media perahu bertenaga uap di kelas v sekolah dasar. <i>Fundamental Pendidikan Dasar</i> , 3(2), 145-152.

		Construction, pada tahap ini dilakukan perancangan dan pengembangan produk. Teknik pengumpulan data yang digunakan dalam penelitian ini adalah studi literatur, wawancara, analisis dokumen, dan expert judgement. Conclusion of Research Results: Hasil penelitian ini mengkonfirmasi bahwa instrumen penilaian sikap pada pembelajaran STEM dibutuhkan dalam kurikulum 2013 untuk menghadapi tantangan globalisasi kehidupan nyata. Produk yang dihasilkan berupa rubrik penilaian sikap pada pembelajaran STEM. Produk tersebut divalidasi oleh beberapa tim ahli sehingga dinyatakan layak digunakan sebagai bentuk penilaian dalam pelaksanaan pembelajaran STEM di kelas V sekolah dasar	
12	Haifaturrahmah, Romi Hidayatullah, Sri Maryani, Nurmiwati, & Azizah. 1,2) Program Studi Pendidikan Guru Sekolah Dasar; 3,4,5) Program Studi Pendidikan Bahasa Indonesia, FKIP, Universitas Muhammadiyah Mataram.	Research Objectives or Problems: Pengembangan lembar kegiatan siswa (LKS) berbasis STEAM serta mengevaluasi kelayakannya Methods, Subjects, Techniques, Instruments, Research Data Analysis: Research and Development Model ADDIE, yaitu analysis, design, development, implementation dan evaluation. Populasi penelitian ini adalah seluruh siswa kelas III SDN 05 Aikmel sebanyak 23 orang, dengan sampel sebanyak 6 orang yang diambil dengan teknik purposive sampling dengan kriteria berprestasi rendah, sedang dan tinggi. Teknik pengumpulan data yang digunakan dalam penelitian ini yaitu angket dan wawancara. Teknik analisis data dilakukan dengan mengolah data respon validator maupun pengguna dengan menggunakan rating scale dengan skala 5, kemudian dikonversi menjadi data kualitatif. Conclusion of Research Results: Rata-rata nilai dari ahli (expert) sebesar 4, 28 dengan kategori sangat baik. Sedangkan respon pengguna (guru dan siswa) sebesar 4, 55 dengan kategori sangat baik. Berdasarkan hasil analisis data tersebut, maka dapat disimpulkan bahwa LKS berbasis STEAM yang dikembangkan layak digunakan sebagai sumber belajar pendukung dalam pembelajaran yang menerapkan pembelajaran tematik terpadu kurikulum 2013.	Haifaturrahmah, Hidayatullah, R., Maryani, S., Nurmiwati, & Azizah. (2020). Pengembangan Lembar Kerja Siswa Berbasis STEAM untuk Siswa Sekolah Dasar. <i>Jurnal Kependidikan: Jurnal Hasil Penelitian dan Kajian Kepustakaan di Bidang Pendidikan, Pengajaran dan Pembelajaran</i>, 6(2), 310-318
13	Epon Nurlaela; Mohamad Sumantri; & Sarkadi Department of Primary Education, Universitas Negeri Jakarta, Indonesia	Research Objectives or Problems: This research aims to develop a Mind Mapping-Based E-Book in steam learning science lesson materials by considering the characteristics, feasibility, and effectiveness of its use in elementary school classes. Tests are conducted to material experts, media experts, and students. Methods, Subjects, Techniques, Instruments, Research Data Analysis: The model used as the basis for the development of Mind Mapping-Based E-Book is ADDIE with its steps Analyze, Design, Develop, implement and evaluate. Data analysis techniques are observations and questionnaires. Conclusion of Research Results: Based on the test results, the material expert validation results showed the material is classified as a very good category with a score of 82.62%. Media quality by linguists is classified as very good with a 90% score category. Media quality by media experts is classified as very good with a score of 85% teacher response test results fall into the category of excellent with a score of 87%. Based on the percentage of score scored it appears that Mind Mapping-based E-Books are well-category and worth using	Nurlaela, E., Sumantri, M., & Sarkadi. (2021). Development of Mind Mapping-Based E-Book in Steam for Skills Skills of Grade VI Elementary School Students. <i>International Journal of Multicultural and Multireligious Understanding</i>, 8(6), 390-399. DOI: http://dx.doi.org/10.18415/ijmmu.v8i6.2787
14	Noni Dwi Sari, & Jan Setiawan. 1) SMP Insan Rabbanu, Kota Tangerang Selatan, Banten. 2) Program Studi Teknik Elektro, Fakultas Teknik, Universitas Pamulang, Kota Tangerang Selatan, Banten	Research Objectives or Problems: Seiring dengan perkembangan teknologi abad 21 dan untuk menghadapi revolusi industri 4.0 penyelenggaran pembelajaran diharapkan lebih inovatif dan kreatif berupa pembelajaran lintas disiplin ilmu. Penggunaan media pembelajaran dalam prosesnya memang mutlak dilakukan agar pembelajaran matematika lebih dinamis dan mampu menjawab tantangan zaman. Untuk itulah penulis mencoba mengembangkan media pembelajaran Papan Geometri, Koordinat dan Pola (papan Gekola) yang dalam penggunaannya dikembangkan dengan pendekatan STEAM sehingga tercipta pembelajaran lintas disiplin ilmu yang inovatif dan menyenangkan serta bermakna. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Penelitian tindakan kelas (PTK) dua siklus yang dilaksanakan di SMP Insan Rabbany. Subjeknya adalah siswa kelas 7. Instrumen data berupa foto dokumentasi, wawancara dan survey. Conclusion of Research Results: Hasil pengembangan media papan Gekola dengan model pembelajaran pendekatan STEAM materi bangun datar menunjukkan peningkatan efektivitas pembelajaran ditinjau dari aspek keaktifan yang memiliki nilai rata rata 89,5, aspek kreasi dan inovasi dengan nilai rata rata 90 serta aspek kemampuan analisis dengan nilai rata rata 91 pada akhir siklus kedua. Secara keseluruhan efektifitas pembelajaran menunjukkan hasil yang sangat baik. Hal ini menunjukkan penggunaan media papan Gekola dengan pendekatan STEAM merupakan suatu inovasi pembelajaran yang efektif untuk menghadapi tantangan revolusi industri 4.0 karena berhasil menerapkan pembelajaran lintas disiplin ilmu yang diperlukan bagi siswa	Sari, N., W. & Setiawan, J. (2020). Papan gekola sebagai media pembelajaran matematika yang inovatif dengan pendekatan STEAM. <i>Jurnal Sains dan Matematika (saintika) UNPAM</i>, 3(1), 32–41.
15	I Nyoman Sudana Degeng, Eddy Sutadji, Yodie Esa Pramudita Rinanityas, Relly Prihatin, Endra Priawasana, Asrorul Mais, & Usman. 1,2,3) Universitas Negeri Malang, Indonesia, 4) STIT Sunan Giri Bima, Indonesia, 5,6) Universitas PGRI, Jember, Indonesia, 7) Universitas Muhammadiyah Sidenreng Rappang, Indonesia	Research Objectives or Problems: The purpose of this study was to discover the existence of cognitive and affective learning outcomes of students using Project Based Learning (PBL) - based STEAM (Science, Technology, Engineering, Art, and Mathematics) with scientific learning with inquiry learning models. Methods, Subjects, Techniques, Instruments, Research Data Analysis: The type of research was a quasi experimental design. Data were collected by means of test analysis, observation, interviews, and documentation from all fifth grade students of primary school. Data analysis used t-test technique. Conclusion of Research Results: To discover the effect of PBL-based STEAM approach on cognitive learning outcomes obtained from the pretest-posttest results, while affective learning outcomes were obtained through observation using the measurement data scale in the rubric. The results showed that there were significant differences between the experimental class and the control class on cognitive learning outcomes, however, there were differences in affective learning outcomes. It is expected to strengthen the results of the discussion in the long term to strengthen cognitive and affective learning outcomes.	Degeng, I., N., S., Sutadji, E., Rinanityas, Y., E., P., Prihatin, R., Priawasana, E., Mais, A., & Usman. (2021). The Effect of PBL-based STEAM Approach on The Cognitive and Affective Learning Outcomes of Primary School. <i>Turkish Journal of Computer and Mathematics Education</i>, 12(6), 2390-2399.
16	Dhea Andryos Yuntiaji, Hamidah Suryani Lukman, Aritsya Imswatama	Research Objectives or Problems: The low ability of students to solve problems in solving problems, especially math problems, needs to be a concern for all. This study aims to produce a STEAM-based digital worksheet design to develop students' problem-solving abilities. Methods, Subjects, Techniques, Instruments, Research Data Analysis: The research method used is R&D research with the ADDIE development model which is limited to the design stage.	Yuntiaji, D., A., Lukman, H., S., & Imswatama, A. (2020). Digital Worksheet Design Based on STEAM to Develop Students' Problem-Solving

	Mathematics Education, Faculty of Teacher Training and Education, University of Muhammadiyah Sukabumi	The design process of this student worksheet through two stages, namely the analysis (analyze) which includes (1) needs analysis, (2) analysis of student characteristics, (3) curriculum analysis aims to determine students' abilities, determine the limitations of the material, and whether or not to develop this worksheet. The second stage is the design (design), the researcher designs the digital worksheets after the worksheets compilation map is carried out, the preparation of the LKS content design, and also the collection of references. Conclusion of Research Results: The result of this design is the design of the presentation of problem-solving problems in the form of problem themes that contain mathematical concepts with the stages of the problem-solving process using the STEAM approach aimed at meeting problem-solving indicators.	Skill. <i>Mathematics Education Journals</i> , 4(2), 137-146.
17	Anis Fitriyah, & Shefa Dwijayanti Ramadani Universitas Islam Madura	Research Objectives or Problems: The development of the industrial revolution 4.0 has shifted the demands of human resources with higher qualifications, namely those with 21st century skills. Unfortunately, creative thinking and critical thinking skills that are part of 21st century skills are still not well empowered. One of the efforts that can be made to improve both types of skills is through PjBL-based STEAM learning (project-based learning). The purpose of this study was to examine the effect of PjBL-based STEAM learning on students' creative thinking and critical thinking skills. Methods, Subjects, Techniques, Instruments, Research Data Analysis: The study used a quasi-experimental design with a nonequivalent pretestposttest control group design. The population in this study were all students of class X MA Miftahul Ulum Bettet Pamekasan in the academic year of 2020/2021; while the sample used included one class of X IPA B for the experimental class and one class of X IPS I used as the control class. The data collected was then analyzed using the anacova test. Conclusion of Research Results: The results of the analysis showed that: 1) PjBL-based STEAM learning had a significant effect on students' creative thinking skills ($P\ 0.000 < 0.005$; $F_{count} = 35.551$). 2) PjBL-based STEAM learning had a significant effect on students' critical thinking skills ($P\ 0.003 < 0.05$, $F_{count} = 9.401$). Thus, it can be concluded that PjBL-based STEAM learning can be used as an alternative learning to empower 21st century skills.	Fitriyah, A.& Ramadani, S., D. (2021). Pengaruh pembelajaran STEAM berbasis PjBL (project-based learning) terhadap keterampilan berpikir kreatif dan berpikir kritis. <i>Jurnal UIN Alauddin</i> , 10(1), 209-226.
18	Ninit Permata Sari Universitas Negeri Jakarta	Research Objectives or Problems: Memberikan manfaat pengetahuan terkait pembelajaran matematika realistic berbasis STEAM di sekolah dasar, baik bagi guru maupun peserta didik. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Metode yang digunakan dalam penelitian ini adalah metode telaah pustaka. Metode telaah pustaka adalah kajian atas pembahasan suatu topik yang sudah ditulis oleh para peneliti atau ilmuwan di dalam berbagai sumber. Sumber informasi tersebut dapat berupa buku, jurnal, ebook, ataupun artikel ilmiah lainnya. Langkah-langkah yang dilakukan untuk penulisan ini adalah: a) pengumpulan data mengenai Pembelajaran Matematika Realistik, STEAM dan bagaimana implementasinya dalam pembelajaran di sekolah dasar; b) menganalisis semua data yang diperoleh berdasarkan pemikiran penulis; dan c) menyimpulkan hasil analisis telaah pustaka. Conclusion of Research Results: STEAM merupakan meta disiplin ilmu yang yang mengintegrasikan sains, teknologi, teknik, seni dan matematika menjadi sebuah pendekatan terpadu yang dapat diimplementasikan dalam pembelajaran di sekolah. matematika realistik berbasis STEAM merupakan proses penerapan ide dan konsep STEAM pada pembelajaran matematika realistik. Penerapan ide dan konsep STEAM dalam pembelajaran matematika realistik memiliki arti bahwa proses konstruksi konsep matematika realistik yang dilakukan dalam sebuah proses pembelajaran matematika harus diikuti dengan gagasan disiplin ilmu yang termuat dalam STEAM	Sari, N., P. (2020). Implementasi pembelajaran matematika realistik berbasis STEAM di sekolah dasar. <i>Jurnal Pendidikan Dasar</i> , pp. 1-13.
19	Ana Nurhasanah, Zelela MS. 1,2) Universitas Sultan Ageng Tirtayasa	Research Objectives or Problems: Menggambarkan penerapan pembelajaran inovatif STEAM di sekolah dasar kota Serang Methods, Subjects, Techniques, Instruments, Research Data Analysis: Penelitian ini dilakukan dengan menggunakan metode naratif dengan teknik wawancara. Subjek penelitian ini adalah guru kelas V di SDN 1 Pamarican Kota Serang Banten. Data dikumpulkan melalui wawancara dan dokumentasi. Conclusion of Research Results: Hasil penelitian menunjukkan bahwa penerapan pembelajaran inovatif STEAM sebagai berikut: 1) perencanaan pembelajaran STEAM yang dikembangkan dalam memandu pendidik untuk melaksanakan tugas sebagai pendidik dalam melayani kebutuhan aktivitas belajar peserta didiknya; 2) Perencanaan pembelajaran dipandang sebagai suatu alat yang dapat membantu pendidik lebih berdaya guna dalam melaksanakan tugas dan fungsinya secara lebih efektif, tepat waktu, dan memberi peluang untuk lebih mudah dikontrol dan dimonitor pelaksanaannya; 3) setiap topik yang dibahas harus sesuai terkait dengan komponen diantaranya science, technology, Engineering, art dan mathematics; dan 4) penilaian harus benar-benar sesuai dengan tujuan performa yang telah ditetapkan. Dengan demikian peserta didik melalui pembelajaran inovatif STEAM memiliki pengalaman langsung sehingga membangun pemahaman materi pembelajaran lebih bermakna. Pendidik menjadi fasilitator yang memfasilitasi pembelajaran dengan pengorganisasian bahan ajar, strategi penyampaian dan pengelolaan kegiatan dengan memperhatikan tujuan, hambatan, dan karakteristik peserta didik sehingga diperoleh hasil yang efektif dan efisien.	Nurhasanah, A., & MS., Z. (2021). Penerapan Pembelajaran Inovatif STEAM di Sekolah Dasar. JIKAP PGSD: <i>Jurnal Ilmiah Ilmu Kependidikan</i> , 5(2), 204-211.
20	Zetra Hainul Putra Program Studi Pendidikan Guru Sekolah Dasar, Fakultas Keguruan dan Ilmu Pendidikan, Universitas Riau	Research Objectives or Problems: Kurikulum 2013 yang menekankan pada pembelajaran tematik terpadu sesungguhnya merupakan cerminan dari pembelajaran interdisiplin karena menggabungkan beberapa disiplin ilmu, seperti matematika, bahasa, sains, dan ilmu pengetahuan alam, kedalam sebuah tema. (1) Pembelajaran interdisiplin antara matematika dan seni musik dan tari, (2) Pembelajaran interdisiplin antara matematika dan literasi yang tertuang dalam buku bergambar matematika, (3) Pembelajaran yang menggabungkan antara olahraga panjat tebing, dengan matematika, dan (4) Pembelajaran STEM atau STEAM. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Pembelajaran interdisiplin antara matematika dengan berbagai bidang ilmu lainnya dari berbagai literatur Conclusion of Research Results: Pembelajaran interdisiplin ilmu di sekolah dasar sebenarnya telah termuat dalam kurikulum tematik terpadu 2013. Perpaduan beberapa bidang ilmu kedalam suatu tema ataupun subtema seharusnya mampu menjadikan siswa lebih aktif dan kreatif. Guru	Putra, Z., H. (2020). Pembelajaran interdisiplin di sekolah dasar. <i>Jurnal Sekolah PGSD FIP UNIMED</i> , 5(1), 112-121.

sebaiknya lebih luwes dalam merancang pembelajaran dan tidak menjadikan buku teks sebagai target pembelajaran yang harus dituntaskan, melainkan memilih dan memilih komponen-komponen yang benar-benar dasar bagi siswa untuk dipahami. Sementara itu, kolaborasi antara guru-guru di sekolah dasar, misalnya dalam menyusun suatu rencana pembelajaran matematika ataupun sains untuk melibatkan guru seni dan guru olah raga, sangat diperlukan sehingga mampu menciptakan pembelajaran yang inovatif, kreatif, dan menyenangkan bagi siswa.

21	Kurniati Fadhilah, Fenny Roshayanti, Verylana Purnamasari Universitas PGRI Semarang, Semarang, Indonesia	Research Objectives or Problems: Pendidikan di Indonesia masih terbilang rendah, karena para peserta didik belum mampu menghadapi tantangan revolusi industri 4.0. Perlu adanya konsep pendidikan yang mampu menjawab tantangan revolusi industri 4.0, salah satunya STEAM (Science, Technology, Engineering, Art, Mathematics). Penelitian ini bertujuan untuk menganalisis potensi STEAM yang terdapat dalam Buku Guru dan Buku Siswa Tema 1-9 Revisi 2017 kelas IV Sekolah Dasar Methods, Subjects, Techniques, Instruments, Research Data Analysis: Penelitian ini merupakan penelitian deskriptif kualitatif dengan objek penelitian yang diarahkan untuk mengetahui potensi STEAM yang terdapat dalam Buku Guru dan Buku Siswa Revisi 2017 kelas IV Sekolah Dasar. Data diperoleh dari data sekunder berupa Buku Guru dan Buku Siswa Revisi 2017 Kelas IV Sekolah Dasar yang telah dianalisis. Metode pengumpulan data menggunakan metode analisis dokumentasi sehingga peneliti menganalisis Buku Tema 1-9 Kelas IV Sekolah Dasar. Metode analisis data yang digunakan yaitu model Miles dan Huberman dimulai dengan pengumpulan data, penyajian data, reduksi data, dan penarikan kesimpulan dan verifikasi. Conclusion of Research Results: Hasil penelitian menunjukkan bahwa terdapat fakta yang sudah berpotensi STEAM dan fakta yang dipotensikan STEAM dengan rata-rata 80% potensi STEAM dari banyaknya pembelajaran pada Tema 1-9. Jadi, hasil analisis Buku Guru dan Buku Tema Revisi 2017 kelas IV Sekolah Dasar sudah berpotensi STEAM. Namun, terdapat beberapa pembelajaran yang memang belum terdapat fakta STEAM, sehingga pembelajaran tersebut tidak berpotensi STEAM.	Fadhilah, K., Roshayanti, F., & Purnamasari, V. (2021). Profile of Thematic Learning Viewed from STEAM in the 2013 Curriculum for Grade IV Elementary School. <i>Jurnal Ilmiah Sekolah Dasar</i> , 5(2), 334-341.
22	Esti Dewi Riyanti, Fenny Roshayati, Verylana Purnamasari 1,3) Program Studi Guru Sekolah Dasar, Universitas PGRI Semarang, Semarang, Indonesia 2) Biologi, Fakultas Matematika, Ilmu Pengetahuan Alam dan Teknologi Informasi, Universitas PGRI Semarang, Indonesia	Research Objectives or Problems: Menganalisis profil pemahaman guru SD terhadap pendekatan STEAM (Science, Technology, Engineering, Arts, and Mathematics). Methods, Subjects, Techniques, Instruments, Research Data Analysis: Jenis penelitian ini adalah deskriptif kualitatif. Subjek penelitian ini adalah pemahaman guru. Pengumpulan data dalam penelitian ini dilakukan dengan metode observasi, wawancara, angket, dan dokumentasi. Instrumen yang digunakan pada penelitian ini yaitu instrumen non-tes berupa angket. Data yang diperoleh dianalisis dengan teknik analisis statistik deskriptif kualitatif dengan cara triangulasi data Conclusion of Research Results: Hasil penelitian ini memperoleh bahwa jumlah dari skor jawaban dari setiap responden didapatkan rata-ratanya yaitu 55,58. Berdasarkan hasil analisis data dan pembahasan dapat disimpulkan bahwa kepala sekolah dan guru belum mengetahui mengenai pendekatan STEAM (Science, Technology, Engineering, Arts, and Mathematics) sebagai pendekatan baru yang dapat digunakan dalam proses pembelajaran yang melibatkan keaktifan siswa. Implikasi dari penelitian ini adalah mengembangkan soft skill peserta didik, yaitu bekerja sama, berfikir kritis, peduli lingkungan, tanggung jawab, keterampilan beradaptasi dan berfikir kreatif.	Esti Dewi Riyanti, E., D., Roshayati, F., & Purnamasari, V. (2022). The Profile of Elementary Teachers' Understanding in STEAM (Science, Technology, Engineering, Art, and Mathematics) Approach. <i>Jurnal Ilmiah Sekolah Dasar</i> , 4(4), 67-686.
23	Dwi Wulandari Fakultas Bahasa dan Seni, Universitas Negeri Yogyakarta	Research Objectives or Problems: Mengetahui bagaimana siswa sekolah dasar mengalami dan memahami hubungan antara seni dan IPA dalam konteks pembelajaran di kelas Methods, Subjects, Techniques, Instruments, Research Data Analysis: Penelitian ini mengeksplorasi persepsi tiga belas siswa kelas 5 di satu Sekolah Dasar Negeri di Papua Barat, Indonesia. Data dikumpulkan dengan menggunakan metode observasi dan wawancara dengan instrumen berupa catatan lapangan, video, rekaman audio, dan transkripsi. Data kemudian dianalisis menggunakan pendekatan analisis tematik. Conclusion of Research Results: Ditemukan adanya perubahan persepsi peserta didik yang awalnya mendikotomi antara seni dan sains yang kemudian beralih menjadi menganggap bahwa kedua disiplin ilmu tersebut memiliki kesamaan dan keterhubungan. Persepsi siswa nampaknya dipengaruhi oleh kondisi penelitian yang menciptakan suasana pembelajaran tematik terintegrasi, pengalaman siswa sebelumnya, manajemen jadwal pembelajaran, serta kondisi dan pengaturan kelas, guru dan sekolah.	Wulandari, W. (2020). Persepsi siswa sekolah dasar terhadap integrasi seni rupa dan ipa dalam pembelajaran di kelas. <i>IMAJI Journal</i> , 18(1), 1-9.
24	Nur Lailatul Badriyah, Anik Anekawati, & Lutfiana Fazat Azizah Department of Science Education, Universitas Wiraraja	Research Objectives or Problems: The purpose of this study is to determine differences in student's learning achievement consisting of learning outcomes and science process skills. Methods, Subjects, Techniques, Instruments, Research Data Analysis: This research was conducted in a special school for girls and used two experimental classes, namely experimental class-1 and experimental-2 class. The experimental class-1 is the class applied by PjBL with a brain-based STEAM approach, while the experimental class-2 is a class that uses PjBL with the STEAM approach without brain-based. This research is a quasi-experimental study with a nonequivalent pre-test-post-test control group design. The data analysis technique used is the Ttest. The brain-based learning activities applied in this study are listening to music, drinking water, doing a brain gym, working on crossword puzzles, and group determination based on the dominance of students' brains. Conclusion of Research Results: The results showed that the average value of the N-Gain score of student learning outcomes in the experimental class-1 was 80,72. Student learning outcomes experimental class-2 is 73,12. In science process skills, the experimental class-1 students had an average N-Gain score of 72,50, while the experimental-2 class was 60,88. The conclusion is the experimental class 1 students have higher learning achievement than students in the experimental class 2.	Badriyah, N., L., Anekawati, A., & Azizah, L., F. (2020). Application of PjBL with brain-based STEAM approach to improve learning achievement of students. <i>Jurnal Inovasi Pendidikan IPA</i> , 6(1), 88-100.
25	Ni Putu Linda Krisna Dewi, I Gede Astawan, I Made Suarjana	Research Objectives or Problems: Menciptakan perangkat pembelajaran RPP Berpendekatan STEAM-PjBL Methods, Subjects, Techniques, Instruments, Research Data Analysis: Jenis penelitian ini yaitu pengembangan dengan menggunakan model ADDIE. Subjek uji coba penelitian ini yaitu 2 ahli materi, 2 ahli media, 2 ahli desain, 2 praktisi, 4 siswa uji coba perorangan serta 7 siswa uji kelompok kecil. Metode pengumpulan data penelitian yaitu observasi, wawancara, dan kuesioner. Instrumen	Dewi, N., P., L., K., Astawan, I., G., & Suarjana, I., M. (2021). Perangkat Pembelajaran Pendekatan STEAM-PjBL pada Tema 2 Selalu Berhemat Energi. <i>Jurnal Pedagogi dan Pembelajaran</i> , 4(2), 222-232.

	Universitas Pendidikan Ganesha, Singaraja, Indonesia	yang digunakan untuk mengumpulkan data yaitu kuesioner. Penelitian menggunakan teknik analisis deskriptif kualitatif dan teknik analisis kuantitatif. Conclusion of Research Results: Penilaian yang diberikan oleh para ahli rata-rata mendapatkan nilai 3,8 sehingga berada pada kategori sangat baik. Hasil penilaian uji coba produk mendapatkan nilai 3,73 sehingga berada pada kategori sangat baik. Jadi perangkat pembelajaran RPP dan LKPD Berpendekatan STEAM-PjBL mendapatkan kualifikasi sangat baik dan layak diterapkan dalam proses pembelajaran dan produk yang dikembangkan dapat digunakan oleh guru dalam proses pembelajaran. Implikasi penelitian ini dapat membantu siswa dalam belajar serta dapat meningkatkan keaktifan siswa dalam belajar sesuai dengan tuntutan kurikulum 2013.	
26	Idam Ragil Widiyanto Atmojo, Roy Ardiansyah, Dwi Yuniasih Saputri, Hadi Mulyono, & Fadhil Purnama Adi PGSD, Universitas Sebelas Maret, Jawa Tengah, Indonesia	Research Objectives or Problems: Mendeskripsikan hasil workshop, praktik, dan implementasi STEAM melalui lesson study Guru SD Methods, Subjects, Techniques, Instruments, Research Data Analysis: Metode yang digunakan dalam pelatihan ini Workshop, Praktik, dan Implementasi. Teknik pengumpulan data menggunakan teknik tes. Teknik analisis yang digunakan menggunakan pre test dan post test. Subjek dalam penelitian ini terdiri guru-guru sekolah dasar yang ada di wilayah administrasi kota Surakarta. Conclusion of Research Results: Pelaksanaan workshop tentang mengimplementasikan Pembelajaran Berbasis Science, Technology, Engenering, Art And Mathematic (STEAM) dapat meningkatkan kompetensi Paedagogik dan Professional Guru SD Melalui Metode Lesson Study yang akan digunakan dalam pelaksanaan pembelajaran.	Atmojo, I., R., W., Ardiansyah, R., Saputri, D., Y., Mulyono, H., & Adi, F., P. (2020). Implementasi Pembelajaran Berbasis Science, Technology, Engenering, Art And Mathematic (STEAM) untuk Meningkatkan Kompetensi Paedagogik dan Professional Guru SD Melalui Metode Lesson Study. <i>Jurnal Pendidikan Dasar</i> , 8(2), 119 – 123.
27	Yuyun Estriyanto Program Studi Pendidikan Teknik Mesin, FKIP, Universitas Sebelas Maret Surakarta, Indonesia	Research Objectives or Problems: Pembelajaran berbasis STEAM dipandang cocok dengan pembelajaran tematik SD karena sama-sama tidak dibatasi mata pelajaran secara kaku, melainkan merupakan integrasi berbagai mata pelajaran yang dikemas menjadi satu tema sehingga bisa dilihat aspek keilmuan, teknologi, rekayasa, seni, dan matematika. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Evaluasi kegiatan dilakukan dengan menggunakan angket. Conclusion of Research Results: Peserta pelatihan memiliki antisuasme yang tinggi terhadap STEAM, kephahaman yang baik mengenai konsep pembelajaran berbasis STEAM, melihat kesesuaian dengan pembelajaran tematik di SD. Namun demikian, peserta masih memerlukan pendampingan lebih lanjut untuk mewujudkan dalam pemebeajaran	Estriyanto, Y. (2020). Menanamkan konsep pembelajaran berbasis STEAM (science, techology, engineering, art, and mathematics) pada guru-guru sekolah dasar di pacitan. <i>Jurnal Ilmiah Pendidikan Teknik Kejuruan (JIPTek)</i> , 13(2), 68-74. DOI: https://dx.doi.org/10.20961/jiptek.v13i2.45124
28	Frensy Graselie Lantu, Kartono, Rio Pranata Program Studi Pendidikan Guru Sekolah Dasar FKIP Untan Pontianak, Indonesia	Research Objectives or Problems: This study aimsto describe the preparation of an online learning implementation plan by grade IV teachers at the 34 Pontianak City Elementary School during the Covid-19 Pandemic Methods, Subjects, Techniques, Instruments, Research Data Analysis: The research method used is descriptive in the form of qualitative research. The source of the data for this research is the fourth-grade teacher of the 34 Pontianak City Elementary School and the data is the online Learning Implementation Plan (RPP) document and the results of interviews with the fourthgrade teacher of the 34 Pontianak City Elementary School. Conclusion of Research Results: The results of the analysis show that the components of the learning implementation plan prepared by the teacher have been guided by the SE Kemendikbud Number 14 of 2019 regarding the simplification of the Learning Implementation Plan, but on the completeness and regularity of the component preparation there are criteria that are not appropriate for the components of objectives, learning scenarios and learning evaluation. Components that meet the appropriate criteria are learning media and learning resources. The implementation of TPACK, HOTS and STEAM elements of innovative 21st century learning is not described in writing in the learning step.	Lantu, F., G., Kartono, & Pranata, R. (2021). Analisis rencana pelaksanaan pembelajaran daring guru kelas IV sekolah dasar negeri 34 Pontianak Kota. <i>Journal UNTAN</i> , 1-14.
29	Iván Sánchez Milara a,b), Kati Pitkänen c), Jari Laru c), Megumi Iwata c), Marta Cortés Orduña a), Jukka Riekkä a). a) Center for Ubiquitous computing, University of Oulu, Oulu, Finland b) Fab Lab Oulu, University of Oulu, Oulu, Finland c) Faculty of Education, University of Oulu, Oulu, Finland	Research Objectives or Problems: There is an increased interest to integrate STEAM methodologies and digital fabrication processes into formal education. However, teachers have repeatedly reported a set of impediments that hampers them to succeed. This integration requires a set of changes in the school organization, resourcing and a proper teacher training. A Community of Practice formed by different stakeholders of a local educational community might provide the necessary grounds to lead to this transition. Methods, Subjects, Techniques, Instruments, Research Data Analysis: In this manuscript, we analyze the impact of the activities presented in the previous chapter on the actors of the CoP. We also investigate their initial perceptions, perspectives and insights. We focus on teachers and principals in this analysis since they were initially in the majority. To that end, we conducted two longitudinal case studies: one covering the whole teacher training and the other covering the principals' training. During these two case studies, we collected different kinds of ethnographic, focus group and survey data. Conclusion of Research Results: We report our experience of creating and scaffolding a local Community of Practice for a period of ten months. We present the different activities we carried out during this period, emphasizing a digital fabrication training that we conducted, at our university Fab Lab premises, for teachers and school principals separately. We also explore the influence of this training on scaffolding of the development of the Community of Practice. We expect the training structure, discussion and insights presented in this paper would inspire other researchers and practitioners trying to bring digital fabrication to formal education.	Milara, I., S., Pitkänen, K., Laru, J., Iwata, M., Orduña, M., C., & Riekkä, J. (2020). STEAM in Oulu: Scaffolding the development of a Community of Practice for local educators around STEAM and digital fabrication. <i>International Journal of Child-Computer Interaction</i> , 2(6), 1-14.
30	Nadifa Salsabila & Abdul Muhid UIN Sunan Ampel Surabaya, Indonesia	Research Objectives or Problems: Membantu anak meningkatkan kreativitas selama belajar di rumah di masa pandemic, kemudian orang tua diharapkan selalu mensupport anak dalam melaksanakan pembelajaran di rumah selama masa pandemic covid-19. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Mengetahui efektivitas pendekatan STEAM berbasis parental support untuk meningkatkan kreativitas anak belajar dari rumah selama masa pandemic covid-19. Conclusion of Research Results: Penelitian ini menggunakan metode literature review dengan mengumpulkan data dan fenomena dari sumber terbaik. Hasil dari penelitian ini menunjukkan	Salsabila, N., & Muhid, A. (2021). Efektivitas pendekatan STEAM berbasis parental support untuk meningkatkan kreativitas anak belajar dari rumah selama masa pandemi covid-19. <i>Jurnal Ilmiah Profesi Pendidikan</i> , 6(2), 247–253. DOI: https://doi.org/10.29303/jipp.v6i2.194

bahwa pendekatan STEAM berbasis parental support efektif dalam meningkatkan kreativitas anak belajar dari rumah selama masa pandemic covid-19.

31	Idam Ragil Widianto Atmojo, Roy Ardiansyah, Dwi Yuniash Saputri Elementary School Teacher Education/ Universitas Sebelas Maret Surakarta, Central Jawa, Indonesia	Research Objectives or Problems: A learning process using STEAM approach is one of the breakthroughs for Indonesian education in order to develop competence in encouraging students to think comprehensively with problem-solving patterns. This research aims to enhance the pedagogical competence and professionalism of elementary school teachers to accelerate the digitalization era of the education field through the use of STEAM approach. Methods, Subjects, Techniques, Instruments, Research Data Analysis: This research used a Classroom Action Research (CAR) method. This research was conducted in Elementary Schools in Surakarta in Gugus Gajah Mada Kecamatan Laweyan which consisted of 8 elementary school partners with a total of 97 teachers. The samples used in this research were the home teachers of 2nd, 3rd, 4th, and 5th-grade amount of 16 teachers. The instruments used in this research stand from 20 performance assessment questions that can measure the teachers' pedagogical competence to accelerate the digitalization era in the education field, and 50 questions to measure teachers' professionalism competence related to the digitalization era in education. Conclusion of Research Results: The result of this research shows that the implementation of STEAM in the learning process in elementary school can enhance the pedagogical competence of teachers teaching competence. and teachers professionalism to accelerate the digitalization era in the education field. STEAM approach makes the students more creative in problem-solving. Indonesia needs to implement education based on science and technology since the early stage in order to accelerate the digitalization era in education	Atmojo, I., R., W., Ardiansyah, R., & Saputri, D., Y. (2020). The Enhancement of Pedagogical Competence And Teachers' Professionalism of Elementary School Teachers to Accelerate The Digitalization Era in The Education Field Through Science, Technology, Engineering, Art, and Mathematics (STEAM) Approach. <i>Conference International, The 4th ICLIQUE, September 5, 2020</i> , Surakarta, Indonesia.
32	Trivena, & Weryanti Laen Langi' Pendidikan Guru Sekolah Dasar, Fakultas Keguruan dan Ilmu Pendidikan, Universitas Kristen Indonesia Toraja, Indonesia	Research Objectives or Problems: Mengidentifikasi persepsi mahasiswa Pendidikan Guru Sekolah Dasar terkait STEAM. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Jenis penelitian yang akan digunakan dalam penelitian adalah jenis penelitian deskriptif kualitatif. Instrumen yang digunakan pada pengumpulan data berupa kuesioner mahasiswa yang terdiri dari 4 item pertanyaan dengan jawaban pilihan ganda dan 48 item pernyataan dengan menggunakan skala Likert. Data yang diperoleh berupa data kuesioner yang diberikan kepada 100 mahasiswa semester V PGSD UKI Toraja dan diperoleh 93 kuesioner yang diisi dan dikembalikan oleh responden. Setelah itu, peneliti menganalisis data yang telah dikumpulkan dari lapangan. Conclusion of Research Results: Hasil penelitian menunjukkan bahwa rata-rata mahasiswa baru pertama kali mendengar istilah STEAM dan hanya mengenal mata kuliah di bidang STEAM secara terpisah-pisah. Persepsi mahasiswa PGSD UKI Toraja terhadap STEAM dari segi sikap, pendapat dan lingkungan sudah cukup baik. Motivasi dan keyakinan mahasiswa terhadap mata kuliah di bidang STEAM sudah nampak. Mahasiswa juga cukup tertarik belajar pada mata kuliah di bidang STEAM dan berpikir bahwa mata kuliah tersebut tidak terlalu sulit. Mahasiswa PGSD juga setuju bahwa pengetahuan yang didapatkan pada mata kuliah yang terkait STEAM mampu membantu dalam pengembangan karir sebagai guru ke depan. Sedangkan dari aspek lingkungan, persepsi mahasiswa positif bahwa kurikulum, fasilitas, orangtua/kerabat dan dosen cukup mendukung dalam pembelajaran yang terkait STEAM.	Trivena, & Langi', W., L. (2021). Persepsi Mahasiswa PGSD UKI Toraja terkait STEAM. <i>Jurnal pendidikan Edumaspul</i> , 5(2), 381-388.
33	Indah Arsy & Syamsulrizal Universitas Pendidikan Muhammadiyah Sorong	Research Objectives or Problems: Penelitian ini mengkaji pengaruh penerapan metode STEAM terhadap keratifitas peserta didik. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Metode yang digunakan dalam penelitian ini yaitu menggunakan metode telaah pustaka. Metode telaah pustaka adalah kajian atas pembahasan suatu topik yang sudah ditulis oleh para peneliti atau ilmuwan di dalam berbagai sumber. Sumber informasi tersebut dapat diperoleh melalui buku, jurnal, ebook, ataupun artikel ilmiah lainnya. Conclusion of Research Results: Hasil yang diperoleh bahwa pembelajaran dengan menggunakan metode STEAM memiliki pengaruh terhadap kreatifitas peserta didik. Dengan adanya STEAM dalam pembelajaran sangat berguna dan bermanfaat, dapat diketahui bahwa tidak hanya aspek kognitif yang dikembangkan, pembelajaran STEAM juga dapat mengembangkan kreativitas peserta didik untuk menghadapi tantangan-tantangan dimasa mendatang Meskipun terdapat perbedaan pendapat dari beberapa ahli namun metode STEAM dapat menjadi solusi pembelajaran bagi peserta didik dalam menghadapi perkembangan teknologi yang dipadukan dengan ilmu pengetahuan.	Arsy, I. & Syamsulrizal. (2021). Pengaruh pembelajaran STEAM (science, technology, engineering, arts, and mathematics) terhadap kreativitas peserta didik. <i>Biolearning Journal</i> , 8(1).
34	Zakiyatul Imamah & Muqowim Universitas Islam Negeri Sunan Kalijaga Yogyakarta	Research Objectives or Problems: Mengembangkan proses belajar dengan menggunakan metode pembelajaran berbasis STEAM and loose part. Serta untuk meningkatkan kreativitas dan berfikir kritis pada anak ditandai dengan anak mampu memecahkan masalah dan mampu membuat hubungan dengan lingkungan sekitar Methods, Subjects, Techniques, Instruments, Research Data Analysis: Penelitian kualitatif deskriptif Conclusion of Research Results: Menggunakan metode pembelajaran STEAM berbasis loose part yang mampu mengembangkan kreativitas dan cara berfikir kritis anak. Kreativitas anak dapat dilihat dari cara bermain, bereksplorasi serta memiliki keterampilan berpikir kreatif dan lancar, kemampuan berpikir kritis yang dimiliki anak dapat kita lihat dalam menganalisis suatu masalah, dapat mengeksplor dengan rinci dan sistematis	Imamah, Z. & Muqowim. (2020). PENGEMBANGAN kreativitas dan berpikir kritis pada anak usia dini melalui metode pembelajaran berbasis STEAM and loose part. <i>YINGYANG Jurnal Studi Islam, Gender, dan Anak</i> , 15(2), 263-277. DOI: https://doi.org/10.24090/yinyang.v15i2.3917
35	Ika Priantari, Aulya Nandha Prafitasari, Dwi Retno Kusumawardhani, & Siti Susanti Program Studi Pendidikan Biologi, FKIP, Universitas	Research Objectives or Problems: The industrial revolution 4.0 era affected people's lives, as well as the education system and student learning. The world of education must be able to create and design learning life skills for the 21 st century, which one of it is critical thinking skills. Efforts are made by applying the STEAM approach and using the PjBL model. Methods, Subjects, Techniques, Instruments, Research Data Analysis: The research was carried out at SMP Muhammadiyah 6 Wuluhan Jember, control class VII B and experiment class VII A. Material KD. 3.8 Analyzing the occurrence of environmental pollution and its impact on the ecosystem. Conclusion of Research Results: The result of the sig (2-tailed) value is 0.046, which indicates that hypothesis is accepted. To be conclude, the STEAM approach and PjBL model have a positive effect on students' critical thinking skills	Priantari, I., Prafitasari, A., N., Kusumawardhani, D., R., & Susanti, S. (2020). Improving Students Critical Thinking through STEAM-PjBL Learning Pembelajaran STEAM-PjBL untuk Peningkatan Berpikir Kritis. <i>Bioeducation Journal</i> , 4(2). DOI: https://doi.org/10.24036/bioedu.v4i2.283

Muhammadiyah Jember, Indonesia		
36	Ani Kholifatul Khoir SD Negeri Banggle 02 Kecamatan Kanigoro, Kabupaten Blitar	Research Objectives or Problems: Kondisi pada wabah Pandemi Covid -19 yang sedang mewabah di Indonesia ini sangat berpengaruh di segala bidang, salah satunya di bidang pendidikan. Dunia pendidikan merasakan dampak yang sangat luar biasa terutama guru dalam proses belajar, agar pembelajaran tetap menyenangkan meskipun belajar di rumah. Sehingga guru diminta dan dipakai untuk membuat perangkat pembelajaran sebagai solusi dan inovasi melalui pemanfaatan berbagai perangkat pembelajaran serta aplikasi daring (online). Methods, Subjects, Techniques, Instruments, Research Data Analysis: Penelitian pengembangan (research and development) dilakukan dengan modifikasi model Borg & Gall. Penelitian ini dipusatkan pada pengkajian terhadap program pendesaian suatu produk dengan tujuan dapat mengamabarkan kondisi atau situasi yang sedang terjadi. Model pengembangannya berupa pembuatan media buku modul yang diimplementasikan melalui (PjBL) dalam proses pembelajarannya. Pengembangan media pembelajaran berbasis (PjBL) memuat beberapa ketrampilan dan diimplementasikan pembelajaran. Conclusion of Research Results: Dalam pelaksanaan pembelajaran, media Beruang Antik memberdayakan keterlibatan orang tua, untuk mengarahkan peserta didik menyelesaikan masalah, mendorong peserta didik bereksplorasi, menemukan cara-cara baru. Keterlibatan Orang tua inilah yang akan membuat pembelajaran secara daring menggunakan Media Beruang Antik ini dapat berjalan maksimal.
37	Dwi Kartini, & Ari Widodo 1) Elementary Education Department, Postgraduate School, Universitas Pendidikan Indonesia, Bandung, Indonesia; 2) Faculty of Mathematics and Science Education, Universitas Pendidikan Indonesia, Bandung, Indonesia	Research Objectives or Problems: 21st century demands education to promote students with STEAM competencies. Most researches on STEAM are mainly focused on students' learning outcomes on STEAM, but only few address non-cognitive aspects. It is necessary to examine elementary teachers and students' beliefs and readiness towards STEAM learning. Methods, Subjects, Techniques, Instruments, Research Data Analysis: The purpose of this research is to explore teachers' and students' beliefs and readiness towards STEAM learning. The surveydesigned method was used in this research. A total of 34 elementary school teachers and 36 elementary school students in the city of Bandung participated in this research. The samples were selected using a random sampling technique. Questionnaires were used to collect research data. Conclusion of Research Results: The results obtained from this research show that students and teachers have positive perceptions in career and benefit of STEAM learning. Students are actually interested in STEAM learning, but the competencies and factors that support and stimulate STEAM learning in schools are still low. The teacher has low competencies to implement STEAM learning. This is due to the lack of knowledge and understanding of teachers about STEAM. This research is expected to contribute to the novelty of teachers' readiness and beliefs in STEAM education in the city of Bandung.
38	Chaerul Rochman, Rokayah, & Neni Hermita. 1) UIN Sunan Gunung Djati Bandung, Bandung, Indonesia; 2) STKIP Sebelas April, Sumedang, Indonesia; 3) PGSD Universitas Riau, Pekanbaru, Indonesia	Research Objectives or Problems: Education continues to develop with very high acceleration. In line with knowledge management sySTEAMs that are very sySTEAMatic, digital and complex. This code greatly influences thematic learning at the elementary level. The paper from the results of this study aims to reveal a profile of scientific literacy skills that support the achievement of students' scientific competencies at the elementary school level. Methods, Subjects, Techniques, Instruments, Research Data Analysis: The method used in this study is participatory pro-active research, where 5th-grade students from one of the private elementary schools in Bandung actively provide data through the instrument. The instrument used was a scientific literacy on thematic learning test and triangulation using interview techniques. Conclusion of Research Results: The results showed that: (1) science literacy skills of 5th-grade students were still below the average, (2) the majority of students still relied on compulsory textbooks as a source of scientific literacy on thematic learning. This study concluded that the ability of scientific literacy on thematic learning in elementary school students in Bandung was still low.
39	Novia Triani Wulandari, Edi Hendri Mulyana, Dindin Abdul Muiz Lidinillah Prodi Pendidikan Guru Anak Usia Dini, Universitas Pendidikan Indonesia, Indonesia	Research Objectives or Problems: Mengetahui dasar kebutuhan analisis unsur art pada pengembangan pembelajaran STEAM subtema kendaraan darat untuk anak usia dini. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Metode yang digunakan yaitu EDR (Educational Design Research) dengan meninjau tahapan 1 yaitu analisis dan eksplorasi. Hasil yang diperoleh setelah dianalisis berdasarkan tahapan try dan try again didapat hasilnya bahwa perlu sebuah dasar kebutuhan dalam pengembangan pembelajaran STEAM dalam unsur art sehingga hasil yang diperoleh anak akan maksimal. Conclusion of Research Results: Dasar kebutuhan analisis unsur art dalam pengembangan pembelajaran STEAM ditinjau dari analisis dan eksplorasi sangatlah penting dan perlu dikembangkan melihat hasil dari kegiatan pembelajarannya masih belum variatif dikarenakan kegiatan dalam unsur art hanya mewarnai saja dan seharusnya 3M (mewarnai, menggunting, dan menempel).
40	Astri Ajeng Lestari, Edi Hendri Mulyana, Dindin Abdul Muiz L. 1,2) PGPAUD & 3) PGSD, Universitas Pendidikan Indonesia, Kampus Tasikmalaya, Indonesia	Research Objectives or Problems: Menganalisis Rancangan Unsur Engineering pada Pengembangan Pembelajaran STEAM Subtema Kendaraan Darat untuk Anak Usia Dini. Alasan dilaksanakannya penelitian ini yaitu untuk menganalisis setiap unsur yang terdapat pada STEAM, sehingga Pembelajaran STEAM dapat dilaksanakan secara optimal. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Metode Educational Design Research dengan menggunakan tahap penelitian menurut McKenney & Reeves, yaitu: 1) Tahap Analisis dan Eksplorasi dan 2) Tahap Desain dan Konstruksi. Teknik pengumpulan data dilakukan dengan cara observasi, wawancara, dokumentasi, dan validasi. Conclusion of Research Results: kegiatan pembelajaran yang dilaksanakan di TK IP Assalaam belum menggunakan model Pembelajaran STEAM, dikarenakan pendidik belum mengetahui kegiatan Pembelajaran STEAM, sehingga peneliti merancang kegiatan Pembelajaran STEAM untuk Anak Usia Dini. Rancangan kegiatan pembelajaran yang dikembangkan mengandung unsur Engineering dan relevan dengan Kompetensi Dasar dan Indikator Pencapaian yang sesuai dengan kurikulum 2013. Analisis kelayakan pada Unsur Engineering dalam Pembelajaran STEAM Subtema Kendaraan Darat untuk Anak Usia Dini, layak diujicobakan karena kegiatan Pembelajaran

		yang dirancang sesuai dengan langkah-langkah pembelajaran STEAM yaitu Ask, Image, Try, Try Again dan sesuai dengan langkah-langkah Engineering Design Process yaitu Ask, Image, Plan, Try, dan Try Again. Adapun Aspek yang dikembangkan dari Unsur Engineering yaitu Kognitif, Bahasa dan Fisik Motorik.	
41	Ika Priantari, Chusnul Khotimah Galatea, Aulya Nanda Prafitasari, Siti Susanti, Dwi Retno Kusumawardhani	Research Objectives or Problems: Para Guru, khususnya dari bidang studi IPA dan Matematika, perlu memacu kemampuannya dalam mengembangkan perangkat pembelajaran, terutama RPP, dengan pendekatan yang fleksibel terhadap berbagai bidang kajian seperti STEAM, termasuk tentang permasalahan lingkungan. Salah satu contoh permasalahan lingkungan yang dapat digunakan sebagai bahan pembelajaran adalah pencemaran lingkungan dikarenakan sampah, terutama sampah anorganik.). Salah satu bentuk kegiatan 3R adalah metode Ecobrick, yakni botol plastik yang dikemas dengan kepadatan tertentu dengan plastik bekas, bersih dan kering untuk mencapai blok bangunan yang dapat digunakan berulang kali. Untuk mencapai hal tersebut, langkah awal adalah memasukkan tindakan nyata penanggulangan sampah pada perencanaan pembelajaran. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Persiapan, pelaksanaan, dan target capaian (pelatihan). Conclusion of Research Results: Melalui STEAM, guru dapat mengarahkan kemampuan sains (Scientific) siswa terhadap lingkungan dan mengintegrasikannya dengan teknologi (Technology), teknik (Engineering), sifat artistik (Art), dan perhitungan beban (Mathematics) yang baik dalam menanggulangi permasalahan sampah anorganik. Hal ini juga dibutuhkan oleh warga SMP Muhammadiyah 1 Jember yang tentu ingin menjadi sekolah yang nyaman dan beradiviyata dan go green.	Priantari, I., Galatea, C., K., Prafitasari, A., N., Susanti, S., & Kusumawardhani, D., R. (2021). Pelatihan penyusunan perangkat pembelajaran pendekatan STEAM-PjBL metode ecobrick untuk peningkatan kompetensi guru di SMP Muhammadiyah 1 Jember. <i>Jurnal Pengabdian Masyarakat Fakultas Psikologi UM Jember</i> , 5(1), 1-13.
42	1) Wiryanto, 2,3) Mohammad Fauziddin, 1) Suprayitno, 1) Budiyo	Research Objectives or Problems: Untuk mengidentifikasi implementasi STEAM (<i>Science, Technology, Engineering, Mathematics</i>) di sekolah dasar internasional maupun nasional. Menggunakan <i>systematic literature review</i> (SLR) dengan pendekatan kualitatif atau disebut dengan <i>meta-synthesis</i> Methods, Subjects, Techniques, Instruments, Research Data Analysis: Litatur yang ditinjau dalam artikel ini adalah sejumlah 19 artikel yang ditemukan dalam <i>Google Scholar</i> Conclusion of Research Results: Berdasarkan hasil study literatur yang dilakukan bahwa implementasi STEAM di Sekolah dasar di Indonesia ialah memberi pertanyaan, menyusun rencana proyek, menyusun jadwal, monitoring, menguji dan menilai, mengevaluasi pengalaman. Sedangkan implementasi STEAM di sekolah dasar internasional ialah mengenali komponen materi, merancang komponen, merancang dan mengimplementasikan mempresentasikan kegiatan atau proyek yang telah dibuat bersama tim. STEAM memberikan dampak yang baik bagi anak terutama <i>soft skill dan skill outcome</i>	Wiryanto, Fauziddin, M., Suprayitno, & Budiyo. (2023). <i>Systematic Literature Review: Implementasi STEAM di Sekolah Dasar Kelas Rendah. Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini</i> , 7(2), 1545-1555.
43	Siti Nur Mufida, Diana Vivanti Sigit, Rizhal Hendi Ristanto	Research Objectives or Problems: This research aims to analyze the effect of the project-based learning with science, technology, engineering, arts, and mathematics (PjBeL-STEAM) learning model on students' science process skills. The PjBeL-STEAM learning model emphasizes on project activities with interdisciplinary through online learning Methods, Subjects, Techniques, Instruments, Research Data Analysis: The research employs a quasi-experimental method with a pretest-posttest control group design. The research population includes students of grade X in ecosystem learning at one of public senior high schools in Jakarta Timur, Indonesia. The research sample consists of 72 students taken using purposive sampling. The main projects in PjBeL-STEAM learning include creating an animation of biogeochemical cycles and independent experiments. The research data on science process skills are collected using pretest and posttest questions. Students' response to learning uses Likert scale instruments. The data analysis technique employs an Independent sample t-test. Conclusion of Research Results: The research results indicate that the PjBeL-STEAM learning model provides better effects on science process skills than in control class. It is necessary to implement the PjBeL-STEAM learning model in online Biology learning to improve science process skills in better ecosystem learning.	Mufida, S., N., Sigit, D., V., & Ristanto, R., H. (2020). Integrated project-based e-learning with science, technology, engineering, arts, and mathematics (PjBeL-STEAM): its effect on science process skills. <i>Biosfer: Jurnal Pendidikan Biologi</i> , 13(2), 183-200. DOI: https://doi.org/10.21009/biosferipb.v13n2.183-200
44	Suraya Bahrum, Md Nasir Ibrahim	Research Objectives or Problems: Mengenal pasti kebolegunaan bidang Sains, Teknologi, Kejuruteraan, dan Matematik (STEM) dalam mata pelajaran Pendidikan Seni Visual di sekolah rendah yang lebih dikenali dengan STEAM. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Kajian kualitatif ini menggunakan reka bentuk kajian kes. Data kualitatif diperoleh melalui temu bual mendalam, pemerhatian dan analisis dokumen. Lima modul STEAM telah dibina dan ditentusahkan oleh pakar bidang. Peserta kajian terdiri daripada tiga orang guru dan 30 orang murid dari tiga buah sekolah rendah harian di bawah Kementerian Pelajaran Malaysia. Penghuraian, pentafsiran dan rumusan data dilakukan dengan meneliti tema, subtema dan soalan kajian. Kesahan dan kebolehpercayaan diperoleh dari teknik delphi dari sekumpulan pakar dan dengan nilai pekali persetujuan Cohen Kappa. Data dianalisis menggunakan atlas-ti dan dapatan kajian dilaporkan berdasarkan kepada soalan kajian. Conclusion of Research Results: Dapatan kajian menunjukkan bahawa modul 1) senang difahami 2) memberi maklumat dan berfaedah 3) Pembelajaran Abad ke-21 4) sebagai panduan integrasi STEM. Dapatan ini menunjukkan implikasi yang positif terhadap pelaksanaan integrasi STEM dan Seni Visual di peringkat sekolah rendah. Diharapkan Kementerian Pendidikan Malaysia dengan penglibatan pihak swasta dapat menyediakan latihan profesional STEAM kepada guru-guru melalui penubuhan jawatankuasa Pelaksana atau penggubalan dasar-dasar yang sesuai dalam usaha memperkukuhkan pendidikan STEM di Malaysia.	Bahrum, S., Ibrahim, M., N. (2018). Kebolegunaan Modul "STEAM" dalam Pengajaran dan Pembelajaran Pendidikan Seni Visual Sekolah Rendah. <i>KUPAS SENI Jurnal Seni dan Pendidikan Seni</i> , 6(1), 65-79.
45	Devie Febriansari, Idam Ragil Widianto Atmojo, Roy Ardiansyah, and Sargian Januardy	Research Objectives or Problems: Batik is one of the cultural heritages that have been established by UNESCO as a Cultural Heritage Humanity's Oral and Non-material (Masterpieces of the Oral and Intangible Heritage of Humanity) since October 2009. Art Batik is the art over the cloths to clothe the beginning only used by the family empires only. The advancement of science in the field of information and communication technology, especially the use of handheld devices Android smartphone has changed the perspective and lifestyle in carrying out daily activities.	Febriansari, D., Atmojo, I., R., W., Ardiansyah, R., & Januardy, S. (2021). NgaBatik: Application Interactive Games to Learn About Design Batik Ngawi Based Android Through The Application of STEAM Learning Model. <i>International Conference on Science</i>

	1,2,3) Elementary School Teacher Education, Faculty Teacher and Training Program, Universitas Sebelas Maret, 4) Bappelitbang Ngawi	Methods, Subjects, Techniques, Instruments, Research Data Analysis: The application of the game to introduce the history and types of batik in Ngawi district is named "NgaBatik". This Ngabatik application is a game application to introduce how to make batik and information about the history and types of batik in Ngawi district. In this application there is a menu of materials covering the history of batik, types of batik, how to make batik cloth, and learning quizzes. There is also a batik game as an interactive means of learning to make batik cloth. Conclusion of Research Results: This application is made into a games interactive education format mockup use software Marvell and is designed to run on devices with operating systems Android and if the teacher want to explain with the students, the teachers can use STEAM learning model	Education and Technology (ICOSETH)2020: Journal of Physics: Conference Series 1842. DOI: https://doi.org/10.1088/1742-6596/1842/1/012009
46	Nurul Qomariyah, Zahratul Qalbi	Research Objectives or Problems: Mendeskripsikan tingkat pemahaman guru PAUD atau pendidik PAUD tentang permainan loose parts. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Metode penelitian yang digunakan adalah kualitatif, dengan menggunakan metode wawancara langsung terhadap guru PAUD di desa Bukit Harapan, Kecamatan Pinang Raya, Kabupaten Bengkulu Utara. Sampel yang digunakan sebanyak 3 orang guru yang mengajar di salah satu sekolah PAUD. Conclusion of Research Results: Dari hasil wawancara di dapatkan bahwa guru belum memahami tentang permainan loose parts tersebut. Dan sekolah juga belum mengaplikasikan pembelajaran berbasis STEAM dengan penggunaan media pembelajaran berupa loose parts. Sehingga untuk mengatasi tertinggalnya pembelajaran yang modern guru-guru disekolah tersebut akan berusaha mencari informasi tentang pembelajaran berbasis STEAM agar dapat mengikuti perkembangan zaman dan kreativitas anak juga dapat tergali dengan maksimal.	Nurul Qomariyah, N., & Qalbi, Z. (2021). Pemahaman Guru PAUD Tentang Pembelajaran Berbasis STEAM dengan Penggunaan Media Loose Parts di Desa Bukit Harapan. <i>JECED : Journal of Early Childhood Education and Development</i> , 3(1), 47-52. DOI : https://doi.org/10.15642/jeced.v3i1.995
47	Irkham Ulil Albab, Yanuar Hery Murtianto, Aryan Eka Prastya Nugraha, Sumarno	Research Objectives or Problems: Facing learning in the New Normal era, teachers must be able to prepare creative and innovative learning that is not just giving online assignments. However, during the pandemic, teachers have problems when carrying out learning. Most teachers find it difficult to prepare creative online learning materials. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Couching authentic method, cualitative descriptive Conclusion of Research Results: The PGRI Semarang university service team offers solutions in the form of learning strategies by combining the themes of each lesson so that learning can be carried out effectively through STEAM-based learning. The use of telegrams for interactive quizzes and Porprofs as a comprehensive evaluation tool that makes it easier for teachers is one of the solutions in learning in the new normal era.	Albab, I., U., Murtianto, Y., H., Nugraha, A., E., P., & Sumarno. (2021). Strategi Sekolah Dikdasmen Kabupaten Kendal dalam Menghadapi Pembelajaran di Era New Normal. <i>Pelita: Jurnal Pengabdian kepada Masyarakat</i> , 1(2), 49-54.
48	Rahman Abdillah, Indra Kurniawan, Fery Rahmawan A.	Research Objectives or Problems: Meningkatkan pengetahuan guru Homeschooling Primagama Bekasi dalam penerapan metode pembelajaran STEAM pada kurikulum K13 dan keterampilan guru dalam pembuatan silabus dan RPP yang menerapkan metode pembelajaran STEAM. Dengan guru memahami penerapan tersebut maka kemampuan guru di kelas akan semakin meningkat. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Pelaksanaan kegiatan ini dilakukan dalam tiga tahap, yakni tahap persiapan, pelaksanaan, dan evaluasi. Pada tahap persiapan, tim abdimas melakukan survey untuk mengetahui kondisi dan menganalisis kondisi tempat yang akan digunakan. Selanjutnya, tim menyiapkan bahan materi yang akan diberikan dalam memberikan pelatihan kepada peserta pengabdian masyarakat. Pada tahap pelaksanaan, dimulai dengan pemberian pemahaman tentang metode pembelajaran STEAM yang diterapkan dalam kurikulum K-13. Kegiatan pengabdian ini dilakukan dengan presentasi, ceramah dengan tanya jawab, dan praktek. Dalam selang waktu pemberian materi, tim abdimas melakukan tanya jawab kepada peserta abdimas yang diharapkan terjadi interaksi antara pengabdian dengan peserta. Setelah selesai, dilakukan pelatihan dalam pembuatan silabus dan RPP K-13 yang menerapkan metode STEAM. Tahapan yang terakhir adalah tahapan evaluasi, tim abdimas memberikan waktu kepada peserta untuk menarapkan secara singkat pembelajaran dengan menerapkan metode STEAM dan dilanjut pembuatan silabus dan RPP yang benar. Conclusion of Research Results: Implementasi metode STEAM pada kurikulum K-13 yang dilakukan oleh Tim dari Universitas Indraprasta PGRI. Tempat pelatihan dilaksanakan di ruang guru HSPG Bekasi. Berdasarkan pelatihan yang telah dilaksanakan diperoleh hasil sebagai berikut: (1) Guru telah mampu membuat RPP dan silabus menerapkan metode STEAM pada kurikulum K13; (2) Guru telah mampu menerapkan metode STEAM pada kurikulum K-13 dalam pembelajaran di kelas dimana inovasi pembelajaran sangat dibutuhkan untuk mewujudkan generasi yang kreatif, inovatif, berpikir kritis, mampu berkomunikasi dan berkolaborasi. Akhirnya ini STEAM (Science Technology Engineering Art Mathematics) dipandang sebagai sebuah pendekatan untuk menyiapkan generasi abad 21, yang bertujuan untuk menstimulasi kreativitas, menyiapkan anak-anak dalam dunia kerja yang penuh inovasi dan invensi.	Abdillah, R., Kurniawan, K., & Rahmawan A, F. (2020). Sosialisasi penerapan metode pembelajaran STEAM pada kurikulum k-13 di homeschooling primagama Bekasi. <i>Prosiding Seminar Nasional Kahuripan I</i> , 91-94.
49	Niken Eka Priyani, Nawawi	Research Objectives or Problems: Mendapatkan gambaran tentang Pembelajaran STEM, kendala dan solusi yang dilakukan oleh guru di daerah 3T (Terluar, Tertinggal dan Terdepan) serta daerah perbatasan Indonesia. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Metode penelitian yang digunakan adalah metode deskriptif kuantitatif. Pengumpulan data dilakukan menggunakan aplikasi google formula yang dibagikan kepada 20 orang Guru Garis Depan yang ada di daerah 3T (Terdepan, Tertinggal, dan Terluar) dan perbatasan Indonesia Conclusion of Research Results: Diperoleh hasil bahwa 80% responden telah menggunakan STEM dalam Pembelajaran, 70% responden telah memahami penerapan STEM dalam Pembelajaran Jarak Jauh, 10% guru menggunakan media berbasis suara berupa pesan suara pada WhatsApp Group dan Handy Talkie. Sedangkan 20% menggunakan gambar dan power point, dan hampir 70% responden menggunakan Youtube atau Google Classroom, 50% resepnden telah menggunakan berbagai aplikasi online, sedangkan 30% meminta siswa membuat proyek, 10% responden meminta siswa mengerjakan praktikum mandiri, serta 10% responden mendatangi siswa secara langsung di rumah saat pandemic Covid-19.	Priyani, N., E., & Nawawi. (2021). Analisis Pembelajaran STEM di Daerah Terluar Tertinggal Terdepan Indonesia Selama Masa Pandemi. <i>Pancasakti Science Education Journal PSEJ</i> , 6(1), 30 – 37. DOI: https://doi.org/10.24905/psej.v6i1.30
50	Jicardo & Rochmiyati	Research Objectives or Problems: This research aims to provide information on the application of STEAM approach to primary school thematic learning. The application of STEAM approach	Jicardo & Rochmiyati. (2021). STEAM'S approach to primary school

	Universitas Lampung, Indonesia	includes aspects of learning planning, application of learning, and assessment of STEAM learning in primary school thematic learning. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Qualitative approach with this type of case study research through observation. The data of the research results are processed with narrative through observation and verification techniques steps to produce credible conclusions. Conclusion of Research Results: The end result that is expected from the application of the team learning approach is that students can take risks seriously to engage in experiential learning, persist in problem solving, embrace collaboration and work through the creative process. central center of the learning process both inside and outside the classroom. STEAM learning is a series of planned activities carried out by students to achieve certain goals under the guidance, direction and motivation of educators. The researcher's suggestion when implementing STEAM-based learning is to provide information that becomes the identity of the learning. So that it is easy to understand like educators or other people if you want to apply it again by becoming a reference for STEAM learning in elementary schools.	thematic learning. <i>Jurnal Ilmiah Teunuleh, The International Journal of Social Sciences</i> , 2(2), 383-392.
51	Sri Lestari SMA Negeri 1 Yogyakarta	Research Objectives or Problems: Mendiskripsikan perkembangan ketrampilan abad 21 dengan pembelajaran PjBL berbasis STEAM berbantuan spectra-plus pada Materi Pokok gelombang bunyi prototype alat musik. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Penelitian ini merupakan penelitian dan pengembangan (R & D) dengan sampel siswa kelas XI MIPA 2 berjumlah 32 di SMA Negeri 1 Yogyakarta Semester 2 Tahun Pelajaran 2019/2020. Untuk mengetahui peningkatan kemampuan berpikir kritis ilmiah setelah pembelajaran PjBL berbasis STEAM berbantuan spectra-plus menggunakan normalized gain, sedangkan kemampuan keterampilan kreatif, komunikasi dan kolaborasi menggunakan angket dan lembar observasi. Metode yang digunakan one group pre-test post-test design. Conclusion of Research Results: Pembelajaran metode STEAM dengan mengaitkan ilmu pengetahuan, teknologi, teknik, seni, dan matematika dapat mengembangkan kemampuan soft skills karena siswa diberikan pemahaman secara menyeluruh tentang keterkaitan bidang ilmu melalui pengalaman belajar keterampilan abad 21.	Lestari, S. (2021). Pengembangan Orientasi Keterampilan Abad 21 pada Pembelajaran Fisika melalui Pembelajaran PjBL-STEAM Berbantuan Spectra-Plus. <i>Ideguru: Jurnal Karya Ilmiah Guru</i> , 6(3), 272-279. DOI: https://doi.org/10.51169/ideguru.v6i3.243
52	Nursakdiah, Firiah Hayati, & Cut Marlini 1,2,3) Universitas Bina Bangsa Getsempena	Research Objectives or Problems: Peningkatan kognitif anak pada lembaga PAUD. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Metode kualitatif dengan penelitian tindakan kelas yang dilaksanakan dalam 2 siklus. Pada setiap siklus dilakukan melalui tahapan perencanaan, pelaksanaan, observasi, dan refleksi. Subjek dalam penelitian ini adalah anak usia dini berusia 5-6 tahun kelompok B2 berjumlah 20 anak yang terdiri atas 9 laki dan 11 perempuan. Data dikumpulkan melalui observasi dan unjuk kerja. Pengolahan data menggunakan teknik analisis deskriptif kualitatif dan menggunakan rumus persentase. Conclusion of Research Results: Peningkatan siklus I ke siklus II terdapat pada aktivitas anak saat bermain, anak mampu memecahkan masalah, peningkatan rasa ingin tahu anak meningkat saat melakukan aktivitas dengan tahapan STEAM menggunakan bahan loose part. Setelah diterapkan pembelajaran ini, anak-anak menjadi lebih semangat dalam berkreasi dengan menciptakan permainan baru dengan bahan loose part yang tersedia sesuai imajinasi anak.	Nursakdiah, Hayati, F., & Marlini, C. (2021). Meningkatkan perkembangan kognitif anak melalui pembelajaran STEAM dengan menggunakan bahan loose part pada anak usia 5-6 tahun di TKIT Syekh Abdurrauf. <i>Jurnal Ilmiah Mahasiswa</i> , 2(1), 1-15.
53	Tri Mulyania LPMP Jawa Tengah	Research Objectives or Problems: STEM (Science, Technology, Engineering, and Mathematics). Menghadapi revolusi industri 4.0 dibutuhkan pendidikan dengan pendekatan yang dapat membekali siswa dengan kompetensi yang sesuai dengan eranya. Dengan pendekatan STEAM, individu dapat bersaing secara global untuk menghadapi perubahan atau kemajuan yang lebih kompleks. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Studi literatur dengan menemukan referensi teori yang relevan dengan kasus atau masalah yang ditemukan pada sejumlah artikel empiris dan konseptual tentang STEM. Conclusion of Research Results: Pembelajaran Berbasis STEM memfasilitasi siswa untuk menggunakan multidisiplin ilmu dalam problem Solving, mengenalkan proses engineering dan teknologi dan melatih ketrampilan abad 21. Sekolah perlu memberikan rekomendasi kepada guru untuk mendapatkan pengetahuan, mengimplementasikan dan mengembangkan pembelajaran berbasis STEM di sekolah, memfasilitasi proses implementasi serta turut mengembangkan menemukan cara melatih ketrampilan abad 21 melalui pembelajaran STEM.	Mulyania, T. (2019). Pendekatan Pembelajaran STEM untuk menghadapi Revolusi Industri 4.0. <i>Seminar nasional pascasarjana</i> , 453-460.
54	Wulan Aulia Azizah, Sarwi, Ellianawati, Pascasarjana Universitas Negeri Semarang	Research Objectives or Problems: Mendeskripsikan hasil wawancara dan tes kemampuan berpikir kritis siswa di SDN Petompon 1 dan kecocokan pendekatan STREAM untuk meningkatkan Kemampuan Berpikir Kritis siswa. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Jenis penelitian kualitatif dengan metode yang digunakan adalah deskriptif dengan pendekatan studi literatur. Teknik pengumpulan data dalam penelitian ini adalah wawancara dan tes soal kemampuan berpikir kritis. Instrumen yang digunakan dalam penelitian ini adalah pedoman wawancara dan soal tes kemampuan berpikir kritis. Conclusion of Research Results: Hasil penelitian meliputi hasil tes kemampuan berpikir kritis siswa terdapat 59% atau 17 siswa yang belum mencapai nilai batas tuntas aktual (BTA) yakni 73. Sehingga, perlunya pengoptimalan peran guru dan penggunaan sebuah pendekatan untuk meningkatkan kemampuan berpikir kritis siswa. Berdasarkan hal tersebut, maka implementasi pendekatan STREAM diharapkan dapat meningkatkan kemampuan berpikir kritis siswa. Peningkatan kemampuan berpikir kritis siswa dapat meningkatkan kualitas sumber daya manusia, sehingga dapat memiliki daya saing dan berjiwa Pancasila dalam era disrupsi.	Wulan Aulia Azizah, W., A., Sarwi, & Ellianawati. (2019). Pendekatan STREAM terhadap peningkatan Kemampuan Berpikir Kritis Siswa Sekolah Dasar. <i>Seminar Nasional Pascasarjana UNNES</i> , 461-466.
55	Alfirda Dewi Nugraheni Universitas Negeri Semarang	Research Objectives or Problems: Perlunya peningkatan pendidikan yang dapat mengasah nalar seperti pada bidang sains dan teknologi, namun pada kenyataannya pendidikan di Indonesia masih tertinggal jauh dalam kualitasnya bila dibandingkan dengan negaranegara maju. Munculnya STEAM menjadi inovasi baru pada dunia pendidikan modern yang berupa suatu kesatuan pembelajaran untuk meningkatkan keterampilan berpikir secara ilmiah yang dapat dilakukan oleh semua jejang pendidikan termasuk pendidikan anak usia dini serta media- media berbasis loose parts digunakan untuk merangsang kreativitas anak.	Nugraheni, A., D. (2019). Penguatan pendidikan bagi generasi alfa melalui pembelajaran steam berbasis loose parts pada PAUD. <i>Prosiding Seminar Nasional Pendidikan dan Pembelajaran</i> , 512-518.

Methods, Subjects, Techniques, Instruments, Research Data Analysis: Metode yang digunakan dalam tulisan ini adalah studi literasi.

Conclusion of Research Results: Tujuan dari pembelajaran STEAM berbasis Loose Parts pada pendidikan anak usia dini adalah mewujudkan pemikiran ilmiah dan kreatif sejak dini. Sebuah inovasi pendidikan pada era revolusi industri 4.0 telah dikembangkan untuk melatih anak berpikir kritis, analitis, kreatif dan inovatif demi tercapainya keoptimalan belajar dalam menghadapi bonus demografi 2045 bagi generasi alfa. Untuk menumbuhkan sikap kritis perlunya literasi-literasi yang digunakan sebagai sumber informasi dalam pembelajaran STEAM ini, pengkombinasian Loose Parts pada pembelajaran ini menjadi suatu yang selaras karena dapat merangsang dan memunculkan sikap kreatif dan inovatif dengan benda- benda sederhana yang digunakan sebagai media pembelajaran.

Research Objectives or Problems: Mengidentifikasi kreativitas mahasiswa yang mengikuti perkuliahan Mikrobiologi pada konten Bioteknologi Tradisional dengan strategi pembelajaran Sains-Teknologi-Religion-Enjinerings-Matematika (STREAM).

Methods, Subjects, Techniques, Instruments, Research Data Analysis: Penelitian merupakan pre eksperimen dengan desain one-shot case study. Instrumen penelitian menggunakan lembar kerja mahasiswa, lembar penilaian produk laporan praktikum dan penyekoran. Sampel penelitian dilakukan secara purposif, yaitu mahasiswa semester 5 kelas B jurusan pendidikan biologi berjumlah 43 orang di salah satu universitas di Bandung. Pengolahan data dilakukan dengan menentukan pencapaian persentase dan level kemampuan kreativitas berdasarkan laporan praktikum.

Conclusion of Research Results: Kreativitas mahasiswa berbeda-beda untuk setiap konten Bioteknologi Tradisional dan berada pada level *not yet evident* dan *emerging*. Hasil pencapaian nilai kreativitas tertinggi yang diperoleh mahasiswa pada indikator berpikir terperinci (elaboration) dengan level muncul (*emerging*) dan pencapaian terendah dengan level belum terbukti (*not yet evident*) pada komponen berpikir orisinal (*originality*). Pembelajaran berbasis STREAM dapat membekalkan kreativitas mahasiswa pada konten Bioteknologi Tradisional.

Agustina, T., W., Rustaman N., Y., Riandi, & Purwianingsih, W. (2021). Membekalkan kreativitas mahasiswa melalui strategi pembelajaran berbasis STREAM menggunakan konten bioteknologi tradisional. *BioEdUIN: Jurnal Program Studi Pendidikan Biologi*, 9(1), 43-52.

Research Objectives or Problems: Menggali informasi terkait implementasi produk Kelompok Instrumen Terpadu-Science Technology Engineering Art Mathematics (KIT-STEAM) sebagai media science inquiry pada tema pembelajaran PAUD Buku Cerita Hewan.

Methods, Subjects, Techniques, Instruments, Research Data Analysis: Jenis penelitian ini adalah penelitian kualitatif dengan subyeknya adalah 3 PAUD di Kota Semarang meliputi TK Hidayatullah, TK Islam Nurul Iman Menjangan, dan TK Islam Sultan Agung 2. Data penelitian ini berupa data kualitatif yang dikumpulkan melalui teknik observasi. Manajemen data penelitian dilakukan dengan menggunakan bantuan software QSR NVivo, sehingga analisis data dan interpretasinya dapat dilakukan dengan mudah. Teknik analisis data digunakan teori Miles & Huberman yang meliputi reduksi data, penyajian data, dan penarikan kesimpulan. Pengujian keabsahan data menggunakan teknik triangulasi sumber.

Conclusion of Research Results: Hasil penelitian menunjukkan bahwa produk Kelompok Instrumen Terpadu-Science Technology Engineering Art Mathematics (KIT-STEAM) sebagai media science inquiry pada tema pembelajaran PAUD Buku Cerita Hewan mampu memfasilitasi siswa dalam mengembangkan kemampuan mengajukan pertanyaan; kemampuan identifikasi masalah; kemampuan mengembangkan/menggunakan model; kemampuan merencanakan dan melaksanakan investigasi; kemampuan analisis dan interpretasi data; kemampuan pemikiran matematika dan komputasi; kemampuan membangun penjelasan; kemampuan teknik memecahkan masalah/solusi desain; kemampuan berargumentasi dari bukti yang ada; serta kemampuan mengevaluasi, dan mengkomunikasikan.

Munawar, M., Roshayanti, F., & Sugiyanti. (2020). Penanaman science inquiry skills pada anak usia dini melalui storytimes berbantuan KIT STEAM. *Seminar nasional hasil penelitian (SNHP) LPPKM Universitas PGRI Semarang*, 321-337.

Research Objectives or Problems: Proses pembelajaran yang diberikan pada usia ini harus memperhatikan HOTS (Higher, Order, Thingking, Skill) disetiap tahap perkembangannya. dengan melaksanakan dan mengimplementasikan pembelajaran bermuatan SELAMeT (Sains, Engineering, Literacy, Art, Mathematics, Technology) dilembaga yang diemban, pendidik harus paham tentang model pembelajaran ini agar anak memiliki kemampuan HOTS dalam menyongsong era pendidikan abad 21.

Methods, Subjects, Techniques, Instruments, Research Data Analysis: Penelitian ini menggunakan pendekatan kualitatif berdasarkan perspektif fenomenologis, dengan tehnik wawancara, observasi, dokumentasi.

Conclusion of Research Results: Kesimpulan dari penelitian pesona pembelajaran bermuatan SELAMeT pada peningkatan HOTS untuk anak usia dini dimana pembelajaran dengan suasana yang bermain, menyenangkan dan menarik pada anak. Secara psikologis dikatakan berhasil untuk meningkatkan HOTS dikarenakan guru telah memfasilitasi beberapa bahan, untuk dijajaki dijelajahi melalui loosepart, guru telah memberikan tantangan dengan invitasi melalui penataan bahan, buku, permainan sedekian rupa agar anak tertarik, guru menjaga anak agar anak tertarik mempelajari lebih dalam melalui SELAMeT.

Rochanah, L. (2021). Pesona pembelajaran bermuatan SELAMeT pada peningkatan host anak usia dini. *SELING: Jurnal Program Studi PGRA*, 7(1), 102-114.

Research Objectives or Problems: Metode pengajaran berbasiskan science, technology, engineering, arts, and mathematics (STEAM) semakin banyak digunakan karena dipercaya mampu membangun kemampuan berpikir kritis pada siswa. Namun, metode ini masih cukup baru di Indonesia. Pengabdian masyarakat ini bertujuan untuk memperkenalkan metode STEAM kepada para siswa kelas 1 sampai 3 di Madrasah Ibtidaiyah Istiqomah Kabupaten Bogor.

Methods, Subjects, Techniques, Instruments, Research Data Analysis: Metode participatory action research (PAR), di mana siswa diberikan penjelasan, melakukan praktikum, dan berdiskusi secara langsung digunakan dalam pengabdian masyarakat ini.

Conclusion of Research Results: Siswa sangat antusias dalam belajar menggunakan metode STEAM. Para siswa merasa bahwa metode STEAM sangat membantu mereka memahami materi pembelajaran. Hal ini mengindikasikan bahwa pengabdian masyarakat berjalan sukses dan bermanfaat bagi para siswa.

Nurwulan, N., R. (2020). Pengenalan Metode Pembelajaran STEAM Kepada Para Siswa Tingkat Sekolah Dasar Kelas 1 Sampai 3. *Madaniya*, 1(3).

60	Dianti Yunia Sari, Aldilla Rahma	Research Objectives or Problems: Penelitian ini dilatarbelakangi oleh kurangnya kemampuan orang tua dalam menstimulasi perkembangan anak di rumah. Maka dari itu, dilakukan penelitian program home visit menggunakan pendekatan STEAM ke rumah orang tua yang memiliki anak usia 3-4 tahun yang bersekolah di PAUD Langgeng Garjita Desa Cisolok Cipanas, Cianjur. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Pelaksanaan Program Home Visit melalui tiga tahap pemahaman, pelaksanaan, dan evaluasi Conclusion of Research Results: Berdasarkan hasil temuan dan pembahasan penelitian mengenai pemahaman orang tua dalam menstimulasi perkembangan anak usia dini menggunakan pendekatan STEAM melalui program home visit, didapat kesimpulan sebagai berikut: 1. Orang tua kurang memiliki pemahaman dalam mengenalkan STEAM pada perkembangan anak dan membutuhkan bantuan untuk meningkatkan kemampuan dalam menstimulasi perkembangan anak, 2. Pelaksanaan program home visit fokus pada pemahaman orang tua dalam mengenalkan STEAM pada perkembangan anak usia dini melalui tiga tahapan. Setiap tahapan dilakukan refleksi sehingga orang tua dapat melaksanakan pembelajaran melalui pendekatan STEAM dengan cukup baik. 3. Program home visit dapat meningkatkan pemahaman orang tua dalam mengenalkan STEAM dalam perkembangan anak melalui stimulasi yang berkesinambungan.	Sari, D., Y., & Rahma, A. (2019). Meningkatkan pemahaman orang tua dalam menstimulasi perkembangan anak dengan pendekatan STEAM melalui program home visit. <i>Jurnal Tunas Siliwangi</i> , 5(2), 93-105.
61	Teguh Setiadi & Laksamana Rajendra Haidar	Research Objectives or Problems: Teknologi sangat membantu untuk mempermudah pekerjaan dan kebutuhan sehari-hari, serta menyediakan hiburan yang beragam bagi yang menginginkannya. Untuk itu, masyarakat dituntut untuk melakukan suatu perubahan di setiap kegiatannya. Proses pembelajaran guru di TK Tunas Harapan yang beralamat di Desa Limbangan Rt 02 Rw 04 Kecamatan Banyu Putih, lebih sering menggunakan media kertas yang di tempel pada dinding maupun menggunakan alat peraga dalam menyampaikan materi pembelajaran belum menggunakan teknologi pembelajaran. Sehingga, anak terasa bosan dan terkadang abai memperhatikan penjelasan guru dan terkadang proses pembelajaran tersebut sangat bergantung pada penyampaian materi yang disampaikan oleh guru secara langsung. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Pendekatan model Research and Development (R & D) dari Borg and Gall dengan 10 tahapan, namun yang penulis gunakan hanya menggunakan 6 langkah tahapan untuk rancangannya. Rancangan pengembangan dengan desain R & D dari Borg and Gall mempunyai tujuan untuk mengembangkan dan memvalidasi produk. Pendekatan model tersebut mempunyai langkah-langkah sebagai berikut: tahap pengembangan diawali dengan melakukan perencanaan (1) identifikasi potensi masalah, (2) membuat desain baru, (3) validasi desain, (4) revisi desain, (5) validasi desain, dan yang terakhir (6) uji coba produk. Pemilihan model Borg and Gall berdasarkan pertimbangan pada model pengembangan yang disusun secara terprogram dengan langkah-langkah persiapan dan perencanaan yang teliti. Conclusion of Research Results: Berdasarkan hasil penelitian yang telah dilakukan tentang perancangan media interaktif mengenal angka untuk TK Tunas Harapan Banyuputih dari hasil penilaian quisioner dengan presentase 72% padat digunakan sesuai ditarik kesimpulan sebagai berikut: 1. Dengan adanya perancangan media interaktif ini, di harapkan dapat menarik perhatian anak untuk belajar mengenal angka. 2. Media interaktif ini diharapkan bisa menjadi salah satu pembelajaran alternative di antara penggunaan media pembelajaran buku dan alat peraga lain sebagai media pendukung dalam proses pengenalan angka. 3. Media pembelajaran ini mengenai pengenalan angka di bentuk dalam bentuk media interaktif yang dilengkapi dengan gambar-gambar dan suara sehingga dapat menarik minat para anak untuk belajar dan mudah dipahami oleh anak.	Setiadi, T., & Haidar, L., R. (2021). Mobile Learning Dalam Pembelajaran Interaktif Untuk Anak Usia Dini Menggunakan Metode STEAM. <i>Jurnal JUPITER</i> , 13(2), 140-149.
62	Efany Camella Aurel, Septi Berlian Br. Ginting	Research Objectives or Problems: Keingintahuan siswa terkait proses pembuatan minyak biji kemiri. Untuk merealisasikan keingintahuan siswa tersebut maka perlu adanya pembelajaran berbasis proyek STEAM untuk memfasilitasi siswa dalam melaksanakan proses pembuatan minyak kemiri Methods, Subjects, Techniques, Instruments, Research Data Analysis: Design Research dengan 5 fase dalam proses pelaksanaannya. Subjek penelitian ini adalah siswa SD Conclusion of Research Results: Siswa mampu mengikuti pembelajaran berbasis STEAM dengan baik sehingga kemampuan berpikir komputasional (<i>computational thinking</i>) siswa juga dapat dikembangkan dengan baik dalam melaksanakan proses pembuatan minyak kemiri dengan mandiri juga siswa dapat melaksanakannya	Aurel, E., C., & Ginting, S., B., B. (2024). Kombinasi STEAM dengan Kemampuan Berpikir Komputasional dalam Proses Pembuatan Minyak Kemiri Siswa Sekolah Dasar. <i>Dukatif: Jurnal Ilmu Pendidikan</i> , 6(2), 1575-1579.
63	Sri Wahyuni, Reswita, & Mar'atul Afidah	Research Objectives or Problems: Pembelajaran Science, Technology, engineering, Art and Mathematic (STEAM) memiliki efek positif pada pembelajaran anak. Metode STEAM dalam pembelajaran mampu melatih peserta didik baik secara kognitif, keterampilan, maupun afektif. Tujuan yang akan dicapai melalui penelitian ini adalah tersusunnya sebuah model pembelajaran bermuatan STEAM yang dapat diterapkan di satuan PAUD. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Metodologi penelitian yang digunakan adalah desain penelitian pengembangan atau research and development dengan responden pengelola dan guru PAUD di Kecamatan Rumbi Pesisir. Conclusion of Research Results: Berdasarkan keseluruhan hasil kuesioner disimpulkan bahwa indikator yang menjadi tolok ukur keterbacaan kurikulum bermuatan STEAM. Terjadi peningkatan pengetahuan dan pemahaman guru setelah dilakukan ujicoba operasional model pengembangan kurikulum PAUD berbasis STEAM pada subjek penelitian yang telah dilakukan.	Wahyuni, S., Reswita, & Afidah, M. (2020). Pengembangan Model Pembelajaran Sains, Technology, Art, Engineering And Mathematic Pada Kurikulum PAUD. <i>Jurnal Golden Age, Universitas Hamzanwadi</i> , 4(2), 297-309.
64	Muhamad Imaduddin, Latifatul Nihayati, Toyib Wahyu Nugroho, Wisnu Bayu Murti, Latifatus Sa'adah, Desy Kurniasari	Research Objectives or Problems: Meningkatkan kompetensi pedagogik guru melalui keterampilan dalam memproduksi Alat Permainan Edukatif (APE). Kajian ini akan memaparkan bagaimana pelaksanaan proses pendampingan guru dalam memproduksi APE, serta bagaimana performa dan implemetasi guru dengan menggunakan APE topik ekologi dengan pendekatan STEAM. Methods, Subjects, Techniques, Instruments, Research Data Analysis: PkM ini merupakan aktivitas pendampingan dalam bentuk pembelajaran yang mengacu pada model pembelajaran berbasis proyek dengan tahapan utama yaitu launching, monitoring, dan evaluating. Peserta kegiatan pengabdian kepada masyarakat ini terdiri dari 90 guru yang terdiri dari 30 guru Pos PAUD, 30 guru Kelompok Belajar, dan 30 guru TK di wilayah kecamatan Temayang, kabupaten	Imaduddin, M., Nihayati, L., Nugroho, T., W., Murti, W., B., Sa'adah, L., & Kurniasari, D. (2021). Pendampingan pembuatan alat permainan edukatif topik ekologi berbasis STEAM pada kelompok guru PAUD Kecamatan Temayang Kabupaten Bojonegoro. <i>Transformasi: Jurnal Pengabdian Masyarakat</i> , 17(1), 27-37.

	Institut Agama Islam Negeri Kudus, Kudus, Indonesia	Bojonegoro, Jawa Timur. Pengumpulan data melalui dokumentasi, observasi produk dan performa kelompok, serta wawancara kelompok. Conclusion of Research Results: Keberhasilan program ini ditunjukkan dari (1) terlaksananya tahapan pendampingan, (2) diperolehnya produk APE yang sesuai dengan target yang ditentukan tim, (3) performa guru sudah menunjukkan penambahan wawasan dalam mengimplementasikan APE dan memodifikasi APE dengan pendekatan STEAM dan (4) respon positif ditunjukkan dengan antusiasme guru	
65	Eris Nurhayati, Yayuk Andayani, Aliefman Hakim 1) Program Studi Magister Pendidikan IPA, & 2,3) Program Studi Pendidikan Kimia. Universitas Mataram, NTB, Indonesia	Research Objectives or Problems: Menghasilkan e-modul kimia berbasis STEM dengan pendekatan etnosains yang valid dan praktis Methods, Subjects, Techniques, Instruments, Research Data Analysis: Pengembangan e-modul didasarkan pada model 4D dari Thiagarajan, S. Semmel & Semmel yang dimodifikasi menjadi tiga tahap yaitu define, design, dan develop. Uji validitas e-modul kimia dilakukan oleh ahli bidang Pendidikan Kimia dan uji kepraktisan dengan responden guru dan peserta didik dilakukan dengan menggunakan angket. Conclusion of Research Results: Hasil penelitian menunjukkan bahwa e-modul kimia berbasis STEM dengan pendekatan etnosains dalam kategori layak dan praktis digunakan dalam pembelajaran dengan perolehan skor berturut-turut sebesar 87% dan 86,2%. Kata Kunci: pengembangan, e-modul kimia, etnosains, STEM.	Nurhayati, E., Andayani, Y., & Hakim, A. (2021). Pengembangan e-modul kimia berbasis STEM dengan pendekatan etnosains. <i>Jurnal Chemistry Education Practice</i> , 4(2), 106-112.
66	Virgilia Zephanya Bratanoto, Lita Latiana, & Ali Formen Pascasarjana Universitas Negeri Semarang	Research Objectives or Problems: Tanpa persiapan yang memadai untuk menghadapi perubahan besar ini (pandemi covid-19), ada banyak kendala yang dihadapi pelaksanaan pembelajaran jarak jauh, meliputi : infrastruktur dan teknologi, strategi pembelajaran, kesiapan guru dan keterlibatan orang tua. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Kajian pustaka Conclusion of Research Results: Masa pandemi Covid-19 ini seharusnya membuat para guru dan orang tua memiliki cara pandang baru dalam proses pembelajaran anak usia dini, terutama ketika proses pembelajaran harus dilakukan dari jarak jauh. Di tengah segala keterbatasan dan kendala yang ada, guru dan orang tua harus bersinergi dalam proses ini untuk mengoptimalkan keseluruhan aspek perkembangan anak. Bagi guru PAUD, diharapkan mampu menyusun rancangan kegiatan pembelajaran STEAM yang inovatif, kreatif dan berteknologi, sekaligus menarik dan mendorong rasa ingin tahu anak untuk mempelajari lingkungan sekitarnya, dengan tetap menjalin komunikasi yang aktif dengan orang tua. Bagi orang tua sendiri, diharapkan tidak sekedar mendampingi anak dalam proses pembelajaran, tetapi terlibat aktif untuk memberi rangsangan pendidikan kepada anak, sehingga semua aspek perkembangan anak terstimulasi dengan baik.	Bratanoto, V., Z., Latiana, L., & Formen, A. (2020). Penguatan Pembelajaran Jarak Jauh Anak Usia Dini Melalui Pendekatan STEAM Dan Pemberdayaan Keluarga. <i>Seminar nasional pascasarjana</i> , 661-670.
67	Siti Nurfadilah, & Joko Siswanto Program Studi Magister IPA, Program Pascasarjana Universitas PGRI Semarang	Research Objectives or Problems: Mengetahui peningkatan kemampuan berpikir kreatif siswa menggunakan pendekatan STEAM bermuatan ESD pada materi konsep Polimer di SMA N 1 Bantarbolang. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Tes ini merupakan study pendahuluan untuk mengetahui kemampuan berfikir kreatif siswa. Subjek penelitian yaitu kelas XII MIA 4 SMA Negeri 1 Bantarbolang Kabupaten pemalang dengan jumlah siswa 32 terdiri dari 10 laki-laki dan 22 perempuan. Kelas XII MIPA 4 di pilih sebagai subjek karena siswanya lebih beragam dibanding kelas empat kelas yang lain. Penelitian dilaksanakan pada semester genap tahun pelajaran 2019/2020. Jenis Instrumen yang digunakan berupa tes tertulis dalam bentuk uraian dengan menggunakan indicator berpikir kreatif dan lembar angket sikap siswa yang berkaitan dengan kreatifitas . Conclusion of Research Results: Terdapat perbedaan prosentase kemampuan berfikir kreatif yang jauh lebih rendah dibanding sikap kreatif siswa, maka untuk meningkatkan berfikir kreatif siswa SMA Negeri 1 Bantarbolang digunakan pembelajaran dengan pendekatan STEAM yang bermuatan ESD.	Nurfadilah, S., & Siswanto, J. (2020). Analisis Kemampuan Berpikir Kreatif pada Konsep Polimer dengan Pendekatan STEAM Bermuatan ESD Siswa SMA Negeri 1 Bantarbolang. <i>Media Penelitian Pendidikan: Jurnal Penelitian dalam Bidang Pendidikan dan Pengajaran</i> , 14(1), 45-51. DOI: http://dx.doi.org/10.26877/mpp.v14i1.5543
68	Rifka Annisa, M. Haris Effendi Hsb, & Muhammad Damris Program Studi Magister Pendidikan Kimia, Program Pascasarjana Universitas Jambi	Research Objectives or Problems: Melihat perbedaan kemampuan berpikir kreatifitas siswa menggunakan model project-based learning berbasis STEAM pada materi asam dan basa Methods, Subjects, Techniques, Instruments, Research Data Analysis: Desain penelitian ini adalah pre-experimental desain dengan jenis penelitian one-group pretest-posttest desain menggunakan sampel penelitian random sampling. Adapun sampel yang dipilih hanya satu kelas yaitu kelas XI MIA 2. Instrument penelitian berupa rencana pelaksanaan pembelajaran, soal pretest dan posttest. Analisis data menggunakan uji paired sampel t-test, nilai rata-rata pretest 1,58 dan posttest 3,17. Hasil korelasi nilai pretest-posttest $0,263 > 0,05$ artinya tidak terdapat hubungan antar nilai pretest-posttest. Nilai signifikansi 2- tailed $0,000 < 0,05$, maka terdapat perbedaan yang nyata kemampuan berpikir kreatif siswa pada data pretest dan posttest. Conclusion of Research Results: terdapat perbedaan yang nyata kemampuan berpikir kreatif siswa dengan penggunaan model poreject based learning pada materi asam dan basa di SMAN 11 Kota Jambi	Annisa, R., Effendi Hsb, M., H., & Damris, M. (2018). Peningkatan Kemampuan Berpikir Kreatif Siswa dengan Menggunakan Model Project Based Learning Berbasis STEAM (Science, Technology, Engineering, Arts Dan Mathematic) pada Materi Asam dan Basa di SMAN 11 Kota Jambi. <i>Jurnal of the Indonesian Society of Integrated Chemistry</i> , 10(2), 42-46. DOI: https://doi.org/10.22437/jisic.v10i2.6517
69	Nana Diana, & Turmudi Program Studi Pendidikan Matematika & Departemen Pendidikan Matematika, Sekolah Pascasarjana, Universitas Pendidikan Indonesia	Research Objectives or Problems: Mengetahui lebih lanjut kesiapan guru-guru di Indonesia terhadap pembelajaran STEM, ditinjau dari pengetahuan mereka terhadap STEM dan pengalaman menyusun modul berbasis STEM. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Metode yang digunakan dalam penelitian ini adalah metode eksploratori. Penelitian ini dilaksanakan secara online dengan menggunakan questionnaire melalui google form. Beberapa guru juga diwawancara untuk mendapatkan konfirmasi atas jawaban yang mereka cantumkan di google form. Subjek dalam penelitian ini terdiri dari 54 orang guru Matematika dan IPA. Setelah data diperoleh, data selanjutnya dianalisis secara kualitatif. Conclusion of Research Results: Berdasarkan penelitian ini diketahui bahwa sebagian besar guru yang mengikuti survey sederhana ini belum memiliki pengetahuan memadai terkait STEM, sehingga guru masih kesulitan dalam menyusun modul berbasis STEM.	Diana, N., & Turmudi. (2021). Kesiapan Guru dalam Mengembangkan Modul Berbasis STEM untuk Mendukung Pembelajaran di Abad 21. <i>Edumatica: Jurnal Pendidikan Matematika</i> , 11(2), 1-8.
70	Hasruddin & Evi Lestari	Research Objectives or Problems: Mengetahui gambaran kemampuan STEAM siswa materi Archaeobacteria dan Eubacteria berbasis gender di SMAN 2 Percut Sei Tuan dan mengetahui	Hasruddin & Lestari, E. (2020). Pembelajaran analisis kemampuan STEAM berbasis gender pada materi

	Program Studi Pendidikan Biologi, FMIPA, Universitas Negeri Medan, Indonesia	pandangan siswa terhadap pembelajaran materi Archaeobacteria dan Eubacteria dengan pendekatan saintifik. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Metode deskriptif dalam penelitian menggunakan populasi seluruh siswa kelas X IPA. Sampel terdiri dari 50 orang siswa laki-laki dan 50 orang siswa perempuan ditentukan secara random sampling. Pengumpulan data menggunakan angket dan 10 soal essay. Data dianalisis menggunakan teknik prosentase dan perbedaan kemampuan gender dilakukan uji t pada taraf signifikansi 5% berbantuan SPSS 24.0. Conclusion of Research Results: Hasil penelitian menunjukkan kemampuan science siswa perempuan (78,67%) > siswa laki-laki (47,07%), $t_{th} > t_{tt}$, $p > 0,05$. Kemampuan technology pada siswa perempuan (61,33%) > siswa laki-laki (47,00%), $-t_{th} > -t_{tt}$, $p > 0,05$. Kemampuan engineering siswa perempuan (64,29%) > siswa laki-laki (50,00%), $t_{th} > t_{tt}$, $p > 0,05$. Kemampuan arts siswa perempuan (72,40%) > siswa laki-laki (65,00%), $t_{th} > t_{tt}$, $p > 0,05$. Kemampuan mathematics siswa perempuan (65,75%) > siswa laki-laki (56,25%), $t_{th} > t_{tt}$, $p > 0,05$. Kemampuan STEAM siswa terdapat perbedaan, siswa perempuan (70,60%) sedangkan siswa laki-laki (53,00%), $-t_{th} > -t_{tt}$, $p > 0,05$. Pandangan siswa perempuan lebih positif dibandingkan siswa laki-laki pada pembelajaran materi Archaeobacteria dan Eubacteria dengan pendekatan saintifik.	archaeobacteria dan eubacteria siswa. <i>Jurnal Pelita Pendidikan: Journal of Biology Education</i> , 8(3), 181-188.
71	Nada Amira & Ana Ratna Wulan Prodi Pendidikan IPA, Sekolah Pascasarjana & Departemen Pendidikan Biologi. Universitas Pendidikan Indonesia Bandung, Indonesia	Research Objectives or Problems: The research objectives are to develop a written test instruments to measure the basic skills of STEAM which being processed its validity and reliability. This written test instruments then being tested to 30 students as the limited trial step of research. This research also aims to describes the quality of the blueprint test and the items developed to measure the basic skills of STEAM. Methods, Subjects, Techniques, Instruments, Research Data Analysis: The research method used in this research is Research and Development (R&D) defined as a process used to develop and validate products used in education and learning. Conclusion of Research Results: STEAM has also been conceptualized as a transdisciplinary teaching and learning approach where you start with the “issue or problem and, through the process of problem solving, bring to bear the knowledge of those disciplines that contributes to a solution or resolution [3]. According to Rasch Model Analysis stated above, Energy in Life System (reliability value = 0.86), Pressure in Substance and Plants (reliability value = 0.81) and Volcanoes and Earthquake (reliability value = 0.89) considered as a very good quality of test items instruments with very good value of Infit and Outfit MNSQ and ZSTD. This means that the test items have the very good qualification of item fit, item measure, item validity, item difficulty rate, and item discrimination. In conclusion, 75 out of 90 items were stored in the item bank and empirically fulfilled the quality as suggested by the Rasch measurement model. The Rasch Measurement Analysis works as the reference to revised the test items, which will be used in the next process of research that is wide-scale trials with 200 respondents for a better and comprehensive result. Also, having the test items more concrete can make it easier to show the student how things are going, and helps adjust learning objectives and outcomes of STEAM curriculum.	Amira, N., & Wulan, A., R. (2020). Development of Written Test Instruments to Measure Basic Skills of STEAM (Science, Technology, Engineering, Arts, and Mathematics) Junior High School Students on Science Concept. <i>Proceedings of the 6th UPI International Conference on TVET, Advances in Social Science, Education and Humanities Research</i> , 520(1), 64-69.
72	Sri Utaminingsih SMAN 1 Ponggok Kabupaten Blitar	Research Objectives or Problems: E-Jurnal M3 berprinsip UTAMI merupakan singkatan dari Elektronik Jurnal Membaca, Menulis dan Menalar. Prinsip UTAMI merupakan singkatan dari Utamakan Membaca dan Menulis Setiap Hari. Anak dapat membaca jurnal penelitian, essay, artikel, blog, koran, majalah dan lainnya. Berikutnya menuliskan ringkasan dan isinya dalam kolom rekam jejak E-Jurnal M3. Selanjutnya ditanda tangani oleh orang tua/wali murid, pembimbing kebahasaan, pembimbing sains, dan mengetahui kepala sekolah. Kegiatan membaca yang disertai menulis dan menalar tersebut selanjutnya diharapkan menghasilkan produk hasil karya yang dapat berupa Karya Tulis Ilmiah (KIR), Essay, Artikel, Poster, VLOG dan lain-lain yang berbasis STEAM sehingga mampu menjawab ketrampilan yang dibutuhkan abad 21. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Penelitian ini merupakan best practice atau praktik mengajar terbaik yang sudah peneliti kerjakan dari tahun ke tahun dan dipraktikkan secara terus menerus dan ditingkatkan aplikasi serta pemanfaatannya. Subyek atau kelas yang diterapkan pengajaran menggunakan aplikasi E-Jurnal M3 berprinsip UTAMI ialah kelas X IPA 1 dengan jumlah siswa 35 anak. Penelitian ini dilakukan di SMAN 1 Ponggok Kabupaten Blitar Provinsi Jawa Timur. Conclusion of Research Results: Melalui membaca jurnal penelitian dan menuliskan pada E-Jurnal M3 berprinsip UTAMI literasi anak menjadi meningkat secara signifikan dari rata-rata 0,1 ke 3,0. Anak mampu membuat produk Inovatif berbasis STEAM dengan rata-rata di atas KKM yaitu sebesar 88 sampai dengan 91,8. Produk inovatif anak merupakan produk yang tergolong orisinal ditandai belum ada di google, unik dan memiliki nilai jual atau nilai ekonomi. Produk Inovatif Keanekaragaman hayati dan VLOG hasil karya siswa mengandung unsur STEAM yang sesuai dengan ketrampilan abad 21.	Utaminingsih, S. (2020). Aplikasi e-jurnal m3 berprinsip utami untuk meningkatkan produk inovatif keanekaragaman hayati berbasis STEAM. <i>ASNA: Jurnal Kependidikan Islam dan Keagamaan</i> , 2(2), 48-58.
73	Suthasini Bureekhampun & Torfhun Mungmee 1) Department of Architectural and Design Education, Faculty of Industrial Education and Technology, King Mongkut's, 2) Institute of Technology	Research Objectives or Problems: Organizing STEAM educational activities which integrate different knowledge areas in order to create an innovation for primary school students that uses many skills is difficult. This is because children aged 6 are different in terms of intelligence, skills and mood. There is a lack of a set of activities that make students happily learn together by playing and get involved with creative and innovative thinking, practice planning and decision skills, and work together as a team. Therefore, encouragement is needed to create a set of learning activities by applying the STEAM educational concept and to evaluate their learning success also using the STEAM educational concept. Methods, Subjects, Techniques, Instruments, Research Data Analysis: This research uses a pre-experimental design method. The research design used is a one shot-case study design. Data Collection Tools The tools which were used in order to collect data during the process of designing this set of activities for children aged six had three parts, These forms were checked by the specialists (IOC-Index of Items Objective Congruence). Data Analysis To analyze the data, the researcher used statistical software called SPSS in order to calculate the mean and standard deviation, and to use the interpretation criteria for the Likert Scale.	Bureekhampun, S., & Mungmee, T. (2020). STEAM education for preschool students: Patterns, activity designs and effects. <i>Journal for the Education of Gifted Young Scientists</i> , 8(3), 1201-1212. https://jegvs.org

	Ladkrabang, Bangkok, Thailand	Conclusion of Research Results: The result of this set of activities was the design of three different moveable robot inspired by a breed of dog called Beagle. The Beagle set of activities were then evaluated by three experts in the area. The outcome was that the first design had the highest mean ($\bar{X}$ = 4.88, S.D. = 0.17). The mean from the structure & control system evaluation of this set of activities was at a very good level ($\bar{X}$ =4.83, S.D.= 0.39). Finally, the learning achievement from using this set of STEAM educational activities with the sample had a mean of 16.07, which is 80.33 %. This means that the proposed set of activities is able to help students to improve the process of their thought. However, the outcome is based on the nature, experience and learning method of each student.	
74	Riyanti, Endang Susilaningih, Ngurah Made Darma Putra Program Studi PGSD. 1,2) Universitas Muhammadiyah Cirebon & 3) Universitas Negeri Semarang, Indonesia	Research Objectives or Problems: This study aimed to determine the feasibility of science learning materials based on Project Based Learning with integrated STEM to improve students' creative thinking skills and teacher responses to the use of learning materials. Methods, Subjects, Techniques, Instruments, Research Data Analysis: The research method used was research and development (R&D) which included several stages, namely problem identification, data collection, design of science learning material using project based learning with integrated STEM, design validation, design revision, small-scale trials and big-scale trials. Conclusion of Research Results: The results showed that the science learning materials developed were suitable for use, namely 3.87 categorized as very valid category. Moreover, teacher responses obtained 97.33% (very good). Students have an increase in their creative thinking skills up to 0.37 (moderate). Therefore, the use of learning materials using projectbased learning with integrated STEM becomes one of the best solutions to improve students' creative thinking skills.	Riyanti, Susilaningih, E., & Putra, N., M., D. (2021). Eveloping Learning Materials of Project-Based Learning with Integrated STEM to Improve Creative Thinking Skill. <i>Educational Management</i> , 10(1), 1-9.
75	1 Ratna Farwati, 2 Kartika Metafisika, 3 Indah Sari, 4 Debora Suryani Sitinjak, 5 Dian Farkhatu Solikha, 3 Solfarina 1) Universitas Islam Negeri Raden Fatah, Palembang, 2) Sekolah Tinggi Agama Islam Taruna, Surabaya, 3) Universitas Sultan Ageng Tirtayasa, Serang, Indonesia, 4) Universitas Pelita Harapan, Tangerang, 5) Department of Chemical Engineering, Akademi Minyak dan Gas Balongan, Indramayu, Indonesia	Research Objectives or Problems: In Indonesia, STEM education has been implemented in the learning process since 2014. The number of researches on the implementation of STEM education are increasing from year to year. Therefore, this research was conducted to map the all articles published online with the theme of STEM education implementation in Indonesia. Methods, Subjects, Techniques, Instruments, Research Data Analysis: The scoping review was carried out following the framework from Arksey & O'Malley (2005), with the following steps: (1) formulating research questions, (2) exploring research results on Google Scholar database from 2015-2020 with the keyword "implementation" + "STEM education" + "Indonesia", (3) sorting the collected articles with predetermined criteria and selecting them according to the PRISMA model, (4) discussion, and (5) conclusion. Conclusion of Research Results: Found 597 articles that match to these keywords and 154 articles that meet the criteria as research data. The results showed that the STEM education is implemented as a learning strategy and approach, integrated with other learning models, used as a learning assessment, and developed into teaching materials, modules, and learning media. Additionally, teachers implement STEM to improve entrepreneurship skills, learning motivation, and various 21st -century skills in their students. Furthermore, research on STEM has been conducted in 19 provinces in Indonesia, which are dominated by West Java and East Java provinces. Beside that, the STEM education has been studied at all levels of education and high school is the most widely used research subject and STEM education has grown in small units and has proven to be capable of developing many student skills. The implementation of STEM education can be a trigger for renewal in the world of education.	Farwati, R., Metafisika, K., Sari, I., Sitinjak, D., S., Solikha, D., F., & Solfarina. (2021). STEM Education Implementation in Indonesia: A Scoping Review. <i>International Journal of STEM Education for Sustainability</i> , 1(1), 11-32. DOI: http://doi.org/10.53889/ijses.v1i1.2
76	 Suraya Bahrum, Norsalawati Wahid, Nasir Ibrahim Faculty of Art, Computing and Creative Industries, Sultan Idris Education University Perak, Malaysia	Research Objectives or Problems: STEM education and political priorities in the US and is rated as one way to ensure global competitiveness. Integrated approach to STEM school level gaining popularity in developed countries like the United States, South Korea, China and Australia. However, much of the debate and suggested that the study of art combined with appropriate discipline of science, technology, engineering and mathematics change STEM to STEAM. STEAM paradigm also emphasizes the importance of STEM education, but also stressed that the art has the ability to open up new ways of seeing, thinking and learning. Whereas current developments in Malaysia has started to show a deep interest and efforts on behalf of the Malaysian government to implement the STEM approach. Methods, Subjects, Techniques, Instruments, Research Data Analysis: This article discusses the development of STEM to STEAM education in the United States and the efforts made in Malaysia have begun to use this approach. This study is a qualitative study using literature review. Conclusion of Research Results: This article proposes combining elements of art into the disciplines in STEM to STEAM in order to strengthen the STEM education, also suggest that the main thing to keep in mind to implement STEM education is to increase the interest of students and teachers' awareness of STEM education. This step involves a new approach to learning and strengthen the curriculum, teacher training and discussions with all interested parties (stakeholders) in order to make STEM education comprehensive and inclusive.	Bahrum, S., Wahid, N., & Ibrahim, N. (2017). Integration of STEM Education in Malaysia and Why to STEAM. <i>International Journal of Academic Research in Business and Social Sciences</i> , 7(6), 645-654. DOI: http://doi.org/10.6007/IJARBS/v7-16/3027
77	 Tritiyatma Hadinugrahaningsih, Yuli Rahmawati, & Achmad Ridwan Chemistry Education Study Program, Universitas Negeri Jakarta, Indonesia	Research Objectives or Problems: The paper portrays the first year of two-year study in integration Science, Technology, Engineering, Art, and Mathematics (STEAM) in chemistry learning. The research focused on developing 21st-century skills of chemistry students in secondary schools. The 21st-century skills as a set of abilities that students need to develop in facing the future challenge which involves learning, literacy, and life skills. The study was conducted in two secondary schools both public and private school in topics of hydrocarbon, petroleum, solubility, and acid base in year 10 and 11. Methods, Subjects, Techniques, Instruments, Research Data Analysis: The qualitative methodology was applied to explore the students' learning experiences and understanding the research context. Data was collected through observation, interview, reflective journal, and 21st-century rubric. The STEAM approach was integrated through modification of project-based learning model. The students had opportunities to develop their own projects by integrating chemistry and STEAM principles to their project. Conclusion of Research Results: students have developed their critical and creative thinking, problem-solving skills, collaboration and argumentation skills, leadership and	Hadinugrahaningsih, T., Rahmawati, Y., & Ridwan, A. (2017). Developing 21st century skills in chemistry classrooms: Opportunities and challenges of STEAM integration. <i>AIP Conference Proceedings</i> 1868, 1-8. DOI: https://doi.org/10.1063/1.4995107

responsibility, information and literacy skills. The researchers faced the challenges of integrating STEAM within the chemistry curricula, empowering students, and managing the teaching and time resources. Students have started to challenge their critical and creative thinking within the existing learning environments. Integrating STEAM into chemistry learning has developed students' 21st-century skills in those three areas. Teachers also learned to develop their competencies for being facilitators and agents of change, in addition to skills development in dealing with students' differences.

78 	Corrienna Abdul Talib, Intan Bidayu Mohd Rafi, Shamini Thanga Rajan, Nur Wahidah Abd Hakim, Marlina Ali, & Ng Khar Thoe 1-5) Faculty of Social Sciences and Humanities, Universiti Teknologi Malaysia, 6) R&D Division, SEAMEO RECSAM	Research Objectives or Problems: A reform STEM (Science, Technology, Engineering, and Mathematics) education has become the guiding principle of science education in many countries and a focus of research efforts including Malaysia Methods, Subjects, Techniques, Instruments, Research Data Analysis: Meanwhile, the STEAM (Science, Technology, Engineering, Arts and Mathematics) education is still new and lacking in literature search. Conclusion of Research Results: In conclusion, teacher in secondary school especially who have been involved in the new syllabus have general knowledge on art skills in active teaching and learning. They are able to use it in the teaching process when necessary. Nonetheless, the use of art is limited by certain skills only, but it will become a pioneer in STEM education in Malaysia and will expand in the future. Finally, the STEM education in Malaysia is still new and at early stages of its implementation. The early stages in Malaysia are focused on teacher's preparation and teacher's understanding. It is important to promote STEM education among teachers as one of the method to enhance students' interest in STEM fields in the future.	Talib, C., A., Rafi, I., B., M., Rajan, S., T., Hakim, N., W., A., Ali, M., & Thoe, N., K. (2019). STEAM teaching strategies in related subject. <i>Education, Sustainability and Society (ESS)</i> , 2(4), 14-18.
79 	Titania Widya Prameswari & Anik Lestarinigrum Program Studi PG-PAUD FKIP Universitas Nusantara PGRI Kediri, Indonesia	Research Objectives or Problems: Permasalahan pembelajaran dalam menghasilkan peserta didik yang memiliki kompetensi 4c masih sangat terbatas terutama di PAUD. Permasalahan itu terlihat dengan capaian perkembangan anak ketika proses pembelajaran berlangsung kreativitas terbatas, anak memiliki kemampuan komunikasi rendah serta mengemukakan pendapat dari hasil berkelompok atau berkolaborasi masih rendah. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Penelitian deskriptif kualitatif dengan subjek penelitian sebanyak 13 anak di Kelompok A usia 4-5 tahun TK Pertiwi 2 Bodor. Pengumpulan data dilakukan dengan teknik observasi dan dokumentasi kemudian dianalisis secara kualitatif menganalisis capaian perkembangan anak secara obyektif. Conclusion of Research Results: Pembelajaran berbasis STEAM menggunakan media loose parts secara efektif meningkatkan kemampuan 4c anak usia 4-5 tahun sehingga direkomendasikan pembelajaran ini terus dilakukan secara berkelanjutan untuk melihat capaian kemampuan di aspek yang lainnya.	Prameswari, T., W., & Lestarinigrum, A. (2020). STEAM Based Learning Strategies by Playing Loose Parts for the Achievement of 4C Skills in Children 4-5 Years. <i>Efektor: Jurnal Ilmiah</i> , 7(1), 24-34.
80 	Heryani Fatmah SMA Negeri 1 Parung, Kabupaten Bogor, Indonesia	Research Objectives or Problems: Mengetahui kreativitas belajar biologi peserta didik kelas 11 IPA .4 SMAN I Parung Kabupaten Bogor pada konsep Bioteknologi, dengan model pembelajaran PjBL (Projek Based Learning) berbasis STEAM (Sains Teknologi Engenering Art Matematic) Methods, Subjects, Techniques, Instruments, Research Data Analysis: Jenis penelitian best praktis dengan teknik penelitiannya analisis deskriptif. Teknik pengumpulan data yang digunakan berupa teknik analisis data yang menggunakan lembar pengamatan dan lembar soal essay test .Subjek pada penelitian ini adalah peserta didik kelas 11 IPA.4 SMAN I Parung yang berjumlah 36 orang terdiri dari laki laki 13 orang , perempuan 23 orang.waktu penelitian pada bulan November 2019 (semester ganjil tahun pelajaran 2019/2020). Conclusion of Research Results: Hasil yang diperoleh, Kreativitas belajar peserta didik dengan menggunakan model pembelajaran Projek Based learning (PjBL) berbasis STEAM pada kelas 11 IPA.4 SMAN I Parung .Hasil yang diperoleh dari penelitian ini untuk tiap indicator kreativitas adalah sebagai berikut : fleksibilitas 94,4 %,Orginalitas 97,2 %, Elaborasi 100 %,fluency 91,6 % . indicator tertinggi diperoleh pada elaborate yaitu 100%, dan perolehan terendah pada indicator fluency sebesar 91,6 dengan rata rata dari ke empat indicator sebesar 95,8% dengan kriteria sangat baik.Dalam penelitian best praktis ini juga didapat hasil belajar yang baik yaitu rata rata nilai kelas 85. Nilai rata rata 85 ini merupakan nilai rata rata di atas kriteria ketuntasan minimal (KKM) yaitu 75	Fatmah, H. (2021). Kreativitas peserta didik dalam pembelajaran bioteknologi dengan PjBL berbasis STEAM. <i>Pedagonal: Jurnal Ilmiah Pendidikan</i> , 5(1), 7-14.
81 	Jamiludin Usman, Luthfatun Nisa', Danang Prastyo, & Nina Khayatul Virdyna Insitut Agama Islam Negeri Madura	Research Objectives or Problems: Mengoptimalkan lembaga PAUD dalam pelaksanaan pendekatan STEAM di PAUD sehingga terlaksana pembelajaran dengan pendekatan STEAM secara tepat pada proses pembelajaran di PAUD. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Deskriptif kualitatif dengan melibatkan 24 orang guru Taman Kanak-kanak yang ada di Islam Terpadu (TKIT) Nurul Hidayah Sampang dengan materi konsep dan implementasi pembelajaran Pendidikan Anak Usia Dini berbasis STEAM. Conclusion of Research Results: Penguatan satuan paud dengan pendekatan pembelajaran berbasis STEAM dalam pendidikan abad 21 ini sangat penting dilakukan dengan cara mengkolaborasi metode yang telah banyak dikuasai oleh guru-guru dan memanfaatkan media yang ada dilingkungan, sehingga memaksimalkan proses pembelajaran.	Usman, J., Nisa', L., Prastyo, D., & Virdyna, N., K. (2020). Penguatan Satuan PAUD melalui Pendekatan Pembelajaran Berbasis STEAM dalam Pendidikan Abad 21 di Taman Kanak-kanak Islam Terpadu Nurul Hidayah Sampang. <i>Pêrdikan: Journal of Community Engagement</i> , 2(2), 93-103.
82 	I Gede Astawan, Dewa Nyoman Sudana, Nyoman Kusmariyatni, & I Gusti Ngurah Japa Department of Primary Education, Universitas Pendidikan	Research Objectives or Problems: Education in general, and science education in particular, have close links with culture. This can be seen from the function of education, which is empowering human potential to inherit and develop future cultures and civilisations Methods, Subjects, Techniques, Instruments, Research Data Analysis: The rationale for the panca pramana based learning cycle is that this knowledge can be proven. Panca pramana consists of pratyaksa pramana, anumana pramana, upamana pramana, sabda pramana, and arthapatti pramana. The panca pramana concept above can be used as a systematic learning cycle in obtaining scientific knowledge/truth. The learning cycle can be started from one of the pramana and then followed by the other pramana. The choice of a cycle can be adjusted to the characteristics of the material being taught. The science curriculum that applies in formal schools, starting from Kindergarten, Elementary School to College, is adopted based on western culture. Conclusion of Research Results: As a result of the practice of education that adopts western culture-style education that does not necessarily fit the style of the nation's own culture, it has been	Astawan, I., G., Sudana, D., N., Kusmariyatni, N., & Japa, I., G., N. (2019). The STEAM Integrated Panca Pramana Model in Learning Elementary School Science in The Industrial Revolution Era 4.0. <i>International Journal of Innovation, Creativity and Change</i> , 5(5), 26-39.

	Ganesha, Indonesia	proven to succeed in forming a generation that is less confident, inferior and infatuated with western culture.	
83	Maya Nur Amelia, & Lenny Nuraeni Institut Keguruan dan Ilmu Pendidikan (IKIP) Siliwangi, Cimahi, Indonesia	Research Objectives or Problems: Kemampuan mengenal huruf pada anak merupakan dasar yang harus anak miliki untuk bisa membaca. Pembelajaran pengenalan huruf pada anak usia dini yang tidak memperhatikan tahapan perkembangan dan karakteristik belajar anak akan mendorong terjadinya stress akademik pada anak Methods, Subjects, Techniques, Instruments, Research Data Analysis: Penelitian ini merupakan penelitian kepustakaan dengan teknik pengumpulan data yang digunakan adalah studi pustaka. Studi pustaka merupakan teknik pengumpulan data dengan cara mengumpulkan data yang berasal dari buku, jurnal, serta karya ilmiah. Analisis data yang digunakan adalah analisis kualitatif yang dilakukan dengan tiga tahapan, yakni reduksi data, penyajian data, dan penarikan kesimpulan Conclusion of Research Results: Penelitian ini membahas tentang penerapan pembelajaran proyek yang dilakukan di sekolah, serta bagaimana penerapan pembelajaran proyek berbasis STEAM. Adapun hasil penelitian ini adalah penerapan metode proyek berbasis STEAM dapat diterapkan melalui proyek Market Day. Dan dalam pembelajaran melalui proyek Market Day, pengenalan huruf dapat disajikan melalui kegiatan bermain secara berkelompok sesuai dengan tema-tema pembelajaran yang terkait dengan proyek Market Day.	Amelia, M., N., & Nuraeni, L. (2021). Penerapan metode proyek berbasis STEAM untuk mengembangkan kemampuan mengenal huruf anak usia dini kelompok B. <i>Jurnal ceria (cerdas energik responsif inovatif adaptif)</i> , 4(2), 151-159.
84	Astri Yansyah Nurinayah, Sri Nurhayati, & Ghina Wulansuci IKIP Siliwangi, Cimahi, Indonesia	Research Objectives or Problems: Mengetahui gambaran tentang penerapan pembelajaran STEAM dalam meningkatkan kreativitas anak di TK Pelita Methods, Subjects, Techniques, Instruments, Research Data Analysis: Penelitian ini menggunakan pendekatan kualitatif dengan metode statistik deskriptif. Teknis pengumpulan data yang digunakan dalam penelitian ini melalui tri angulasi yaitu melalui kegiatan observasi, wawancara dan studi dokumentasi. Subjek penelitiannya adalah kepala sekolah, guru-guru dan anak-anak di kelompok B. Analisis data dilakukan melalui pengumpulan data, reduksi data, pengelompokan data, penyajian data serta penarikan kesimpulan. Conclusion of Research Results: Hasil penelitian tentang Penerapan pembelajaran Sains Teknologi Engineering Art Matematic melalui metode proyek di TK Pelita dapat mengembangkan aktifitas pembelajaran anak serta kreativitas anak meningkat melalui tahapan: 1) menyusun perencanaan proyek. 2). Membuat jadwal pelaksanaan proyek. 3) melaksanakan proyek. 4). memantau anak dan kemajuan proyek. 5) penilaian hasil.	Nurinayah, A., Y., Nurhayati, S., & Wulansuci, G. (2021). Penerapan pembelajaran STEAM melalui metode proyek dalam meningkatkan kreativitas anak usia dini di TK Pelita. <i>Jurnal ceria (cerdas energik responsif inovatif adaptif)</i> , 4(5), 504-511.
85	Riyanti Universitas Negeri Semarang, Indonesia	Research Objectives or Problems: Mengetahui efektivitas penggunaan perangkat pembelajaran project-based learning (PjBL) terintegrasi STEM berbasis e-learning untuk meningkatkan kemampuan berpikir kreatif siswa. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Jenis penelitian ini adalah kuantitatif eksperimen, design pre-experimental dengan the one group pretest-posttest. Populasi dalam penelitian ini adalah siswa kelas IV Sekolah Dasar Kecamatan Plered tahun pelajaran 2019/2020. Teknik sampling yang digunakan adalah purposive sampling. Terpilih dua kelas sampel IVA dan IVB SDN 3 Panembahan sebagai kelompok eksperimen. Analisis data menggunakan uji normalitas, uji homogenitas, uji ketuntasan rata-rata, uji proporsi, uji perbedaan rata-rata dan N-gain. Conclusion of Research Results: Diperoleh hasil peningkatan n-gain skor 0,37 dengan kategori sedang. Hasil nilai pretest-posttest kemampuan berpikir kreatif siswa mengalami perbedaan sebelum dan sesudah menggunakan perangkat pembelajaran PjBL terintegrasi STEM berbasis e-learning.	Riyanti. (2020). Efektivitas Penggunaan Perangkat Pembelajaran Project Based Learning (PjBL) Terintegrasi STEM Berbasis E-Learning Untuk meningkatkan Kemampuan Berpikir Kreatif. <i>DWIJA CENDEKIA: Jurnal Riset Pedagogik</i> , 4(2), 206-215.
86	 Aitzol Lasa, Jaione Abaurrea, & Haritz Iribas 1,2) Public University of Navarre, Arrosadia Campus, 31006 Iruña, Spain; 2) Mondragon University, Loramendi 4, 20500 Arrasate, Spain	Research Objectives or Problems: Pendidikan STEM dianalisis secara sistematis dari kacamata pendidikan matematika. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Pada penelitian ini, proyek inovasi ekstensif dilaksanakan selama tahun akademik 2019/2020 dalam studi percontohan yang dilakukan di Program Pelatihan Guru dan Sekolah di Navarre (Spanyol), yang terdiri dari analisis bibliografi dan sumber sebagai langkah sebelumnya untuk mengkarakterisasi materi yang ada, dan akhirnya merancang dan menguji proyek STEM di tingkat pendidikan yang berbeda dari sudut pandang pendidikan matematika. Semua aktivitas didasari oleh publikasi internasional dan repositori web yang digunakan secara luas dan kontras, dan memanfaatkan pendidikan yang wajib pada umumnya, yaitu, mulai dari awal Sekolah Dasar (usia 6/7) hingga akhir Sekolah Menengah (usia 15/16). Conclusion of Research Results: Penemuan ini menggambarkan aktivitas STEM yang mana matematika sebagian besar bersifat utilitarian, bilangan dan unit secara fungsional digunakan untuk mengukur besaran, dan konten geometri berfungsi untuk memodelkan prototipe teknologi. Hasilnya, sejumlah kegiatan berlabel STEM tidak memenuhi prinsip dan tujuan yang mendasar dari konten STEM itu sendiri. Di tingkat yang lebih rendah, terdapat kesalahan umum antara aktivitas STEM dan proyek laboratorium sains; sedangkan, di tingkat yang lebih tinggi, konten matematika yang kompleks dapat muncul. Meskipun beberapa kegiatan merupakan proyek laboratorium sains terbimbing, dapat disimpulkan bahwa sebagian besar kegiatan STEM memiliki potensi situasi didaktis, sebagai contoh konteks yang mana siswa mempraktikkan teknik pemecahan masalah pribadi mereka sebelum guru memformalkan konten matematikanya.	Lasa, A., Abaurrea, J., & Iribas, H. (2020). Mathematical content on STEM activities. <i>Journal on Mathematics Education</i> , 11(3), 333-346. DOI: http://doi.org/10.22342/jme.11.3.11327.333-346
87	Iik Nurhikmayati Pendidikan Matematika, FKIP, Universitas Majalengka	Research Objectives or Problems: Memberikan manfaat pengetahuan terkait STEAM dan implementasinya dalam pembelajaran matematika di sekolah, baik bagi guru dan dosen sebagai pelaku pembelajaran Methods, Subjects, Techniques, Instruments, Research Data Analysis: Metode yang digunakan dalam penelitian ini adalah metode telaah pustaka. Metode telaah pustaka adalah kajian kritis atas pembahasan suatu topik yang sudah ditulis oleh para peneliti atau ilmuan di dalam berbagai sumber. Sumber informasi dapat berupa buku, jurnal, ebook, ataupun artikel ilmiah lainnya. Langkahlangkah penulisan yang dilakukan adalah: a) pengumpulan data mengenai STEAM dan bagaimana implementasinya dalam pembelajaran di sekolah; b) menganalisis data yang diperoleh berdasarkan pemikiran penulis; dan c) menyimpulkan hasil analisis telaah pustaka. Conclusion of Research Results: Implementasi STEAM dalam pembelajaran matematika merupakan proses penerapan ide dan konsep STEAM pada pembelajaran matematika. Penerapan	Nurhikmayati, I. (2019). Implementasi STEAM dalam Pembelajaran Matematika. <i>Jurnal Didactical Mathematics</i> , 1(2), 41-50.

		ide dan konsep STEAM dalam pembelajaran matematika memiliki arti bahwa proses konstruksi konsep matematika yang dilakukan dalam sebuah proses pembelajaran harus diikuti dengan gagasan disiplin ilmu yang termuat dalam STEAM yaitu sains, teknologi, teknik, seni dan matematika. Terdapat banyak topik matematika yang dapat diterapkan dengan pembelajaran berbasis STEAM diantaranya bangun ruang, peluang, aritmatika social, trigonometri dan lainnya. Implementasi STEAM dalam pembelajaran matematika sangat berguna dan bermanfaat, tidak hanya dapat mengembangkan kemampuan pada aspek kognitif, pembelajaran STEAM juga dapat mengembangkan kemampuan dan skill lain yang berguna bagi peserta didik untuk menghadapi tantangan era globalisasi di masa mendatang.	
88	Eka Mainig Andriana, Ratnasari Dyah Utami, & Andari Sehati. 1,2) Universitas Muhammadiyah Surakarta 3) SD Negeri Pucangan 04 Kartasura	Research Objectives or Problems: Mengetahui apakah pendekatan saintifik berbasis STEAM dapat meningkatkan kreativitas belajar peserta didik pada pembelajaran tematik kelas V SD Negeri 16 Purwodadi tahun pelajaran 2020/2021. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Penelitian ini merupakan Penelitian Tindakan Kelas dengan 2 siklus. Teknik pengumpulan data menggunakan wawancara, observasi, dokumentasi. Conclusion of Research Results: Terdapat peningkatan kreativitas belajar peserta didik, yaitu melakukan hal baru, 42,50% menjadi 50,63% (siklus I), 76,88% (siklus II). Menyelesaikan pembelajaran, 41,25% menjadi 54,38% (siklus I), 75,63% (siklus II). Memperhatikan media dan bahan ajar, 35% menjadi 55,63% (siklus I), 76,25% (siklus II). Antusias, 35% menjadi 55,63% (siklus I), 76,25% (siklus II). Berani menjawab, 38,75% menjadi 54,38% (siklus I), 75% (siklus II). Berani mengungkapkan ide, 31,25% menjadi 53,13% (siklus I), 74,38% (siklus II). Teliti, 35% menjadi 55,63% (siklus I), 80,63% (siklus II). Tidak putus asa, 42,50% menjadi 50,63% (siklus I), 76,88% (siklus II). Ulet, 41,25% menjadi 54,38% (siklus I), 76,25% (siklus II). Membuat karya, 33,75% menjadi 56,25% (siklus I), 78,13% (siklus II). Disimpulkan bahwa pembelajaran menggunakan pendekatan saintifik berbasis STEAM dapat meningkatkan kreativitas belajar pada pembelajaran tematik kelas V SD Negeri 16 Purwodadi tahun pelajaran 2020/2021.	Andriana, E., M., Utami, R., D., & Sehati, A. (2021). Peningkatan Kreativitas Belajar Peserta Didik Melalui Pendekatan Saintifik Berbasis STEAM di Sekolah Dasar. <i>Educatif: Journal of Education Research</i>, 3(4), 51-60.
89	Sarantos Psycharis Department of Education, School of Pedagogical & Technological Education (ASPETE) Heraklion Attikis, 141 21 Athens, Greece	Research Objectives or Problems: Here we discuss the role of Computational Thinking (CT), Engineering Education Epistemology (EEE) , Computational Science Education (CSE) and the integration of Arts with STEM in education and more generally in learning and teaching approaches and learning objectives. We present arguments from research articles and we propose activities that support our model for Computational STEAM Pedagogy. Methods, Subjects, Techniques, Instruments, Research Data Analysis: The purpose of the literature review is to outline research studies in the different forms of STEAM integration and to highlight how CT, EEE, CSE and Arts can be used in this integration and what epistemology can support this holistic approach. Conclusion of Research Results: The present article adds to the literature as an introduction of a pedagogical approach, the —Computational STEAM Pedagogy-CSPI, when the engineering education is added in the computational experiment approach in the framework of the transdisciplinary epistemology which also integrates Arts in STEM. Research is in progress for investigation of the impact of this approach to large scale to schools and Universities. Findings will be of special interest to individuals, teachers, Vocational School and tertiary Education educators and stakeholders who concern about the STEAM integration in the curriculum, the quality of STEAM education and it will also trigger discussions of what STEAM education should be.	Sarantos. (2018). STEAM in education: a literature review on the role of computational thinking, engineering epistemology and computational science; Computational STEAM Pedagogy (CSP). <i>Scientific Culture</i>, 4(2), 51-72. DOI: http://doi.org/10.5281/zenodo.1214565
90	Eni Rakhmawati, Wa Ode Riniati, Badriyah, & Irmawati 1) Institut Agama Islam Bakti (IBN) Tegal, 2) Universitas Muhammadiyah Buton, 3) Politeknik LP3I Jakarta, 4) STAI Pangeran Dharma Kusuma Segeran Indramayu, Indonesia	Research Objectives or Problems: Pembelajaran STEAM mendorong siswa untuk berpikir kritis dan menganalisis informasi. Melalui eksperimen, proyek, dan tugas-tugas kreatif, siswa belajar untuk menyusun argumen, membuat prediksi, dan mengevaluasi hasil. Tujuan penelitian ini adalah untuk menganalisis implementasi pembelajaran STEAM pada kelas rendah di sekolah dasar. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Metode yang digunakan dalam penelitian kualitatif dengan studi pustakan atau Literature Review. Tujuannya adalah untuk menganalisis perbandingan teori-teori yang ada dengan teori-teori sebelumnya dalam literatur penelitian. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Literatur yang digunakan adalah literatur dari hasil penelitian atau kajian yang disajikan dalam artikel ilmiah Conclusion of Research Results: Pembelajaran STEAM di kelas rendah khususnya di sekolah dasar merupakan pembelajaran kontekstual, dimana anak diajak untuk memahami kejadian yang terjadi dalam ruang lingkup kehidupan sehingga anak mengeksplorasi semua kemampuan yang dimilikinya dan memunculkan karya yang berbeda dari individu maupun kelompok. Kolaborasi, Kerjasama, dan komunikasi diterapkan dalam proses pembelajaran karena STEAM dilakukan secara berkelompok untuk merangsang kemampuan bertanggung jawab dan memecahkan masalah baik personal ataupun interpersonal terhadap pembelajaran serta mampu mengkonstruksi pemahaman terhadap materi yang disampaikan..	Rakhmawati, E., Riniati, W., O., Badriyah, & Irmawati. (2024). Implementasi pembelajaran STEAM pada kelas rendah di sekolah dasar. <i>Al-Madrasah: Jurnal Ilmiah Pendidikan Madrasah Ibtidaiyah</i>, 8(1), 127-133, DOI: https://doi.org/10.35931/am.v8i1.2930
91	N. Diana, Turmudi, & Yohannes 1,3) Program Studi Pendidikan Matematika, 2) Departemen Pendidikan Matematika. Sekolah Pascasarjana, Universitas Pendidikan Indonesia	Research Objectives or Problems: STEM approach in learning is applicable in the 21st century in which it promotes 4C skills: communication, collaboration, creativity, and critical thinking. The implementation of STEM increases the productivity of the learning process in responding to the challenges of the industrial revolution 4.0. Because it is relatively new in Indonesia, the application of the STEM approach in learning has certain difficulties for teachers. Methods, Subjects, Techniques, Instruments, Research Data Analysis: This article is a literature study based on previous researches that explores the difficulties faced by Indonesian mathematics and science teachers in applying the STEM approach in learning based on the latest five years studies. The purpose of this paper is to explore the difficulties experienced by teachers in implementing STEM in order to find the right solution to overcome the difficulties. this study literature conducted by using these following steps, which include: (1) identified STEM education articles that revealed teachers' difficulties, (2) analysed teachers' difficulties in implementing STEM from each article, (3) classified teachers' difficulties in implementing STEM based on main focus (mathematics or science), (4) grouped teachers' difficulties with similar category and (5) discovered appropriate solution to overcome its difficulties Conclusion of Research Results: The STEM learning approach is an appropriate solution to master the 21st century skills and responding to changes in the educational innovation due to the	Diana, N., Turmudi, & Yohannes. (2020). Analysis of teachers' difficulties in implementing STEM approach in learning: a study literature. <i>International Conference on Mathematics and Science Education (ICMSE)</i>, 1-7. DOI: http://doi.org/10.1088/1742-6596/1806/1/012219

		industrial revolution 4.0. Because it is relatively new in Indonesia, the application of the STEM approach in learning has certain difficulties for teachers. Based on literature review, the difficulties faced by teachers in implementing STEM or STEAM are varied depending on its main focus (mathematics or science). However, in the several mentioned studies, both Indonesian mathematics and science teachers shared common difficulties in implementing STEM as follows: low understanding about STEM, the lack of facilities and limited time provided in learning schedule. Therefore, to overcome teachers' difficulties mentioned before, several solutions are offered depends on the needs such as increasing teachers' comprehension toward STEM, completing school facilities and adjusting curriculum targets under the implementation of STEM. Regarding to the limitation of this study that only comparing mathematics and science teachers' difficulties in implementing STEM in Indonesia, the authors suggest the following researchers can investigate teachers' difficulties in implementing STEM which focusing on engineering and technology and also finding other solutions to overcome teachers' difficulties in implementing STEM.	
92	 Kartika Metafisika & Ratna Pangastutia Sekolah Tinggi Agama Islam Taruna Surabaya, Indonesia	Research Objectives or Problems: Desain “Pengembangan Pembelajaran STEAM AUD Kurikulum 2013” ini dikembangkan dengan tujuan menggali kreatifitas guru PAUD dan calon guru PAUD untuk menganalisis secara mandiri pertanyaan STEAM PBL yang dapat dikemukakan kepada anak dan bagaimana jawaban yang diharapkan muncul pada anak. Selain itu, guru PAUD dapat mengeksplorasi hal-hal disekelilingnya untuk dimanfaatkan dalam pembelajaran STEAM. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Penelitian ini merupakan bagian dari Research and Development untuk pengembangan desain pembelajaran sains dan matematika untuk Anak Usia Dini. Pertama-tama peneliti melakukan analisis kebutuhan. Berdasarkan hasil studi pendahuluan, peneliti merancang desain pengembangan pembelajaran STEAM mengacu pada pedoman pengembangan tema Kurikulum 2013. Berdasarkan desain tersebut dilakukan pengembangan desain Pembelajaran STEAM dalam Kurikulum 2013 Pendidikan Anak Usia Dini disertai penerapannya. Conclusion of Research Results: Berdasarkan hasil analisis kebutuhan diketahui bahwa pelatihan STEAM dengan pendekatan PBL dan Media Loose Part yang disosialisasikan kepada guru-guru TK di Indonesia, sedangkan STEAM dapat dikembangkan dengan media apa saja. Desain pengembangan pembelajaran STEAM pada Kurikulum 2013 bertujuan untuk memudahkan para guru/calon guru PAUD mengidentifikasi apa dan bagaimana muatan STEAM dapat diterapkan dalam pembelajaran. Selain itu guru juga mampu mengidentifikasi kompetensi dasar dan indikator yang dapat diterapkan dalam pembelajaran STEAM tersebut sebagai pedoman proses pembelajaran, dan evaluasi.	Metafisika, K., & Pangastutia, R. (2020). Pengembangan Pembelajaran STEAM Kurikulum 2013 untuk Pendidikan Anak Usia Dini. <i>Global Conferences Series: Social Sciences, Education and Humanities (GCSSEH)</i> , 6, 19-26.
93	 Gabriela Ileana Crișan, Ion Albușescu Babes-Bolyai” University of Cluj-Napoca, Rumania	Research Objectives or Problems: At European level and not only, they have been searching for solutions to motivate students' study within the STEM subjects (Science, Technology, Engineering, Mathematics). The initiatives carried out in this respect derive from a certain concern regarding the lack of labour able persons required by the 21st century economy. Even if STEM education could provide solutions to these problems by developing the students' ability for problem solving, critical thinking, communication abilities, etc., there is a certain resentment in the students' attitude towards these subjects Methods, Subjects, Techniques, Instruments, Research Data Analysis: There are studies in reference literature highlighting the role of flipped classroom introduction as a solution to the problems that the students are facing. The contents are managed through video recordings. The transmitter (the teacher / the specialist) conveys a message which is delivered to the receiver (the students) by means of a communication channel (the Internet). As far as Visual Arts are concerned, this strategy implies tutorial making by help of the arts teacher or of the specialist in which primary school students may be presented different artistic-plastic styles and manners, as for example, the impressionism, the cubism, the abstract expressionism. This vertical partnership solves the problem of insufficient initial training of primary teachers in the field of plastic arts Conclusion of Research Results: The introduction in the educational process within the conditions of more growing demands from the economy of the XXIst century society of some research policies meant to bring more creativity to STEM- related subjects, is being justified by the necessity of acquiring competences and skills to labour able persons. The lack of flexibility, of the ability for permanent training, of problem-solving and critical thinking abilities require reconsiderations and restructurations in education. One of the measures taken in view of acquiring necessary competences related to social, professional, personal life is the inclusion of the A „creativity power” in the STEM „innovation engine” starting from the first stage of education. The introduction of Arts and Design in the core of scientific/mathematical subjects determines, in young students, the acquiring of some specific cross- competences, contributing to an increased motivation towards learning, thus becoming attractive and accesible.	Crișan, G., I., & Albușescu, I. (2021). From STEM to STEAM through flipped classroom Imitation as a semantic mark. <i>University of Bucharest and “L. Blaga” University of Sibiu</i> , 249-256.
94	 Siti Zubaidah Pendidikan Biologi, FMIPA, Universitas Negeri Malang, Indonesia	Research Objectives or Problems: Perkembangan teknologi yang semakin pesat disebabkan adanya revolusi industri, yang saat ini berada pada revolusi industri 4.0 mengakibatkan berbagai perubahan dalam segala sendi kehidupan manusia, termasuk dunia pendidikan yang harus membekali siswa dengan berbagai keterampilan yang dikenal dengan keterampilan abad ke-21. Salah satu gerakan yang dimunculkan adalah pembelajaran STEM (Science, Technology, Engineering, and Mathematics) yang kemudian berkembang menjadi STEAM (dengan penambahan ‘Arts’), bertujuan membekali para siswa dengan berbagai keterampilan yang dibutuhkan untuk menghadapi berbagai perubahan dunia yang tidak terduga. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Penelitian kualitatif deskriptif Conclusion of Research Results: Tumbuhnya gerakan pembelajaran STEAM pada pendidikan dasar dan tinggi merupakan daya tarik untuk alasan pendidikan yang lebih baik. Siswa yang terlibat dalam pembelajaran STEAM akan belajar bagaimana cara belajar (metakognisi), cara bertanya, cara bereksperimen dan cara berkreasi membuat sesuatu. Sistem pembelajaran "tradisional" berdasarkan hafalan yang terstandardisasi adalah jenis pendidikan yang kurang dibutuhkan lagi oleh anak-anak kita di dunia yang menghadapi tantangan global yang sistemik, luas dan membingungkan ini. Sistem pendidikan harus diarahkan untuk membekali anak-anak dalam menyelesaikan masalah	Zubaidah, S. (2019). STEAM (Science, Technology, Engineering, Arts, and Mathematics): Pembelajaran untuk Memberdayakan Keterampilan Abad ke-21. <i>Seminar Nasional Matematika dan Sains FKIP Universitas Wiralodra Indramayu</i> , 19 Sep'.

nyata yang multidisiplin. Dengan menggunakan pendekatan STEAM ini, siswa akan terlibat dalam berbagai disiplin ilmu secara bersamaan, mereka belajar untuk melihat masalah dari berbagai perspektif yang berbeda. Pendekatan ini mempersiapkan siswa untuk tantangan sejati dunia kita yang semakin kompleks.

95	 Natalia V. Soroko, Lorena A. Mykhailenko, Olena G. Rokoman, & Vladimir I. Zaselskiy 1) Institute of Information Technologies and Learning Tools of the NAES of Ukraine; 2) Shupyk National Medical Academy of Postgraduate Education, Ukraine; 3) Brovary secondary school of I-III levels No. 1, 153 Kyivska Str., Brovary, 07400, Ukraine; 4) State University of Economics and Technology, 5 Stepana Tilhy Str., Kryvyi Rih, 50006, Ukraine	Research Objectives or Problems: The article is devoted to the problem of the use of educational electronic platform for the organization of a STEAM-oriented environment of the general school. The purpose of the article is to analyze the use of educational electronic platforms for organizing the STEAM-oriented school learning environment and to identify the basic requirements for supporting the implementation and development of STEAM education in Ukraine. One of the main trends of education modernization is the STEAM education, which involves the integration between the natural sciences, the technological sciences, engineering, mathematics and art in the learning process of educational institutions, in particular, general school Methods, Subjects, Techniques, Instruments, Research Data Analysis: To achieve the purpose of our study and also to clarify the problem of creating the STEAM-oriented educational environment regarding the main ways of using educational e-platforms to support STEAM education there were used the following methods: systematic and comparative analysis of pedagogical, psychological, philosophical, sociological works, methodological and specialized literature; analysis of the pedagogical experience of using the STEAM-oriented educational environment in general school; synthesis and generalization to formulate the main points of the study; interpretation of the research results. Conclusion of Research Results: Thus, creating the STEAM-oriented educational environment is one of the ways to develop and reform the educational system, which, in particular, should influence on students' motivation of learning STEAM disciplines, on forming their creative thinking through the use of ICT and various arts in the educational process to solve STEM research problems. The STEAM-oriented educational environment has to impact on the formation of students' skills in the fields of natural sciences, technology, mathematics, the formation students creative critical thinking, solving practical research issues through synergy between STEAM disciplines and the use of ICTs. The STEAM-oriented educational environment is an educational environment, in which ICTs create learning and teaching conditions in synergy with the natural sciences, technology, engineering, arts, mathematics, teamwork, cooperative work of teachers and students for the effective achievement of teaching goals, and comprehensive personality development.	Soroko, N., V., Mykhailenko, L., A., Rokoman, O., G., & Zaselskiy, V., I. (2020). Educational electronic platforms for STEAM-oriented learning environment at general education school. <i>Asia-Pacific Science Education Journal</i>, 462-473.
96	 Danang Prastyo, Trisa Kumalasari, Samsiah, & Siti Lebar IAIN Madura & Universitas Wahidiyah, Indonesia	Research Objectives or Problems: Keterampilan abad 21 yang disebut 4Cs, dalam bahasa Indonesia bisa diingat dengan singkatan 4 K, yaitu kreativitas, kritis, komunikasi, kerjasama. Hal ini senada dengan teori Bloom bahwa kreativitas merupakan kemampuan yang paling tinggi dalam aspek perkembangan kognitif. Oleh karena itu, kreativitas penting diberikan pada Pendidikan Anak Usia Dini. Penelitian ini bertujuan menguji efektifitas STEAM dalam meningkatkan 4K terhadap anak dalam belajar PANCASILA dimasa pandemi. STEAM dalam menerapannya tidak bisa lepas dari loosepart yang dapat meningkatkan kreatifitas anak. Tolak ukur kreatifitas yang tinggi ditandai dengan meningkatkannya keterampilan berpikir, keterampilan berpikir fleksibel, keterampilan berpikir orisinal dan keterampilan berpikir merinci. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Metode penelitian menggunakan deskriptif kuantitatif. Grand desain dengan pretest dan post test dengan jumlah responden 25 anak. Conclusion of Research Results: Hasil penelitian menunjukkan ada perbedaan signifikan terhadap 4K pada anak sebelum mendapatkan perlakuan dan sesudah mendapatkan penerapan metode STEAM. Penerapan Metode STEAM dalam pelaksanaan pembelajaran dapat meningkatkan kemampuan anak ditandai dengan mampu memecahkan masalah dan mampu membuat hubungan dengan lingkungan sekitar khususnya pada pengetahuan PANCASILA.	Prastyo, D., Kumalasari, T., Samsiah, & Lebar, S. (2021). Implementasi 4 C dalam pendidikan Pancasila berbasis STEAM. <i>JCE (Journal of Childhood Education)</i>, 5(1), 49-59.
97	 Frisca Ninda Safilda, Bambang Sri Anggoro, Rizki Wahyu Yunian Putra, Ahmad Sodik, & Nurhasanah Leni. 1,2,3,4,5) Universitas Islam Negeri Raden Intan Lampung.	Research Objectives or Problems: (1) adanya perbedaan antara model pembelajaran Scramble berbasis STEAM (Science, Technology, Engineering, Art, Mathematics) dan pembelajaran model ceramah terhadap kemampuan pemahaman konsep matematis. (2) adanya perbedaan kategori gaya belajar auditorial, visual dan kinestetik peserta didik terhadap pemahaman konsep matematis. (3) adanya interaksi antara faktor model pembelajaran dengan gaya belajar terhadap kemampuan pemahaman konsep peserta didik. Methods, Subjects, Techniques, Instruments, Research Data Analysis: Penelitian ini menggunakan teknik analisis data uji Anova dua jalan. Berdasarkan hasil analisis diperoleh kesimpulan bahwa penggunaan model pembelajaran scramble berbasis STEAM (Science, Technology, Engineering, Art, Mathematics) dapat mempengaruhi kemampuan pemahaman konsep peserta didik dan tipe gaya belajar yang dimiliki peserta didik juga dapat mempengaruhi kemampuan pemahaman konsep peserta didik. Conclusion of Research Results: Berdasarkan hasil nilai ulangan harian menunjukkan bahwa kemampuan pemahaman konsep matematis peserta didik di SMP Negeri 24 Krui masih rendah, terlihat dalam proses peserta didik menyelesaikan masalah, faktor yang menyebabkan hal ini terjadi adalah banyaknya siswa kurang kesadaran dalam hal memperhatikan dan memahami pelajaran atau bisa dikatakan malas belajar serta metode pembelajaran yang kurang mendukung. Penelitian ini bertujuan untuk mengetahui adakah perbedaan model pembelajaran scramble berbasis STEAM dan pembelajaran model ceramah terhadap kemampuan, pemahaman konsep matematis ditinjau dari gaya belajar. Jenis penelitian ini menggunakan Quasi Experiment Design. Sampel pada penelitian ini adalah kelas eksperimen dan kelas kontrol. Kelas eksperimen diberikan perlakuan model pembelajaran scramble berbasis STEAM, sedangkan kelas kontrol diberikan perlakuan model konvensional dengan model ceramah.	Safilda, F., N., Anggoro, B., S., Putra, R., W., Y., Sodik, A., & Leni, N. (2021). Analisis Pemahaman Konsep Berdasarkan Gaya Belajar Pada Model Scramble Berbasis STEAM. <i>Jurnal Penelitian Matematika dan Pendidikan Matematika</i>, 4(2), 98-107.
98	 Mihyun Son, Daehong Jeong Seoul National University	Research Objectives or Problems: It is necessary to look at the essence of STEAM education from the viewpoint of the teacher who is the subject of education execution. We carry out questionnaires and telephone interviews for the purpose, definition, change, etc. of STEAM education from eight elementary, middle, and high teachers who are rich in policy and field application experience	Son, M. & Jeong, D. (2019). Limits of STEAM Education and its Improvement Alternative : Based on the Viewpoints of STEAM Expert Teachers. <i>Journal of the Korean Association for Science Education</i>, 39(5), 573-584. DOI:

Methods, Subjects, Techniques, Instruments, Research Data Analysis: As a result of the analysis, the purpose of the STEAM education that the specialists mentioned includes the active participation of the students. Most experts pointed out that the definition of STEAM education is ambiguous. So, it is necessary to express a clear goal of STEAM education. The category and level meaning “fields” from “a convergence of two or more fields” are not indicative definitions, but can be different depending on the situation, considering the context of activities and the level of students

Conclusion of Research Results: The perception of the experts on framework may be a guide for STEAM education and stumbling block. It is necessary for “Context” to shift away from the emphasis on the real life connection and to the emphasis on the interest of the student and the guidance of the class. “Creative design” must be based on trial and error in the process of solving problems. “Emotional touch” needs to correct elements that cannot be observed, evaluated, and applied to lessons that are elements of emotional experience. As for the expansion of STEAM education, most expert teachers have recognized that STEAM education is becoming increasingly stable and that policy change has continued to slow the pace of stabilization.

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99	Romadlon	Research Objectives or Problems: Meningkatkan kemampuan guru dalam menerapkan model pembelajaran STEM di Sekolah Dasar Negeri 86/X Harapan Makmur Methods, Subjects, Techniques, Instruments, Research Data Analysis: Penelitian tindakan kelas. Subjek Penelitian Ini Adalah guru Di Sekolah Dasar Negeri 86/X Harapan Makmur, Kecamatan Rantau Rasau, Kabupaten Tanjung Jabung Timur, Propinsi Jambi. Penelitian tindakan kelas ini dilaksanakan dalam dua siklus, setiap siklus terdiri dari dua pertemuan Conclusion of Research Results: Hasil observasi awal totsl rata rata sebesar 58,56 dan presentase ketuntasan hanya mencapai 50%. Hasil evaluasi dikonversikan dengan tabel hasil penyampaian rekapitulasi siklus I. Hasil konversi menyatakan bahwa penelitian belum mencapai target, perlu dilanjutkan dengan siklus II. Hasil observer pada tahap pelaksanaan siklus II menunjukkan bahwa semua bagian dalam kegiatan pembelajaran sudah berlangsung dengan baik, sehingga tidak ada lagi bagian kegiatan pembelajaran yang perlu diperbaiki. Sedangkan hasil siklus II yang dikonversikan dengan hasil tabel rekapitulasi menyatakan bahwa penelitian sudah mencapai batas target kriteria ketuntasan pada siklus I yakni sebesar 50% dan rata-rata yaitu 67,5 pada kondisi awal perbaikan pada siklus II kriteria ketuntasan menjadi 87,5% dan rata-rata yakni 87,46 menyatakan bahwa workshop dapat meningkatkan kemampuan guru dalam menerapkan model pembelajaran STEM dalam pembelajaran di Di Sekolah Dasar Negeri 86/X Harapan Makmur Tahun Ajaran 2019/2020.	Romadlon. (2020). Meningkatkan Kemampuan Guru dalam Menerapkan Model Pembelajaran Stem Melalui Workshop di Sekolah Dasar Negeri 86/X Harapan Makmur Tahun 2019/2020. <i>Jurnal Ilmiah Dikdaya</i> , 10(1), 102-106. DOI: https://doi.org/10.33087/dikdaya.v10i1.164
100	Min Kyeong Kim , Ji Young Lee, Hyeonsu Yang, Juhyun Lee, Ji Na Jang, & Seon Joo Kim. Ewha Womans University, South Korea	Research Objectives or Problems: The purpose of this study is to examine the perceptions of elementary school teachers and the conditions within which they teach. This study is expected to contribute to the preparation for the new technology demands of our rapidly changing society and the recent changes made to the 2015 Revised National Curriculum aimed at Fostering Creative-Convergence Human Resources in Korea. It is primarily expected to contribute to the application of the Science, Technology, Engineering, Arts and Mathematics (STEAM) education and Math-Focused STEAM education. Methods, Subjects, Techniques, Instruments, Research Data Analysis: For this purpose, we surveyed 273 teachers of 24 public schools in Seoul and Gyeonggido area. The results showed that teachers recognized ‘convergence’ in STEAM education either as an ‘integrated approach’ in which specific subjects or topics are taught together or as a ‘convergent approach’ to teach together and further to a new one. In addition, positive responses were shown towards Math-Focused STEAM education in terms of its effectiveness on the education and needs of the students. Conclusion of Research Results: This study is expected to support the increased application of Math-Focused STEAM education in the field, and thus to expand the knowledge embodied in the subject of mathematics.	Kim, M., K., Lee, J., Y., Yang, H., Lee, J., Jang, J., N., & Kim, S., J. (2019). Analysis of Elementary School Teachers’ Perceptions of Mathematics-Focused STEAM Education in Korea. <i>EURASIA Journal of Mathematics, Science and Technology Education</i> , 15(9), 1-13. DOI: https://doi.org/10.29333/ejmste/108482

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