Some of Frontiers Education Articles: Around First to Eleven December 2020

Thobias Sarbunan
Ambon State Christian Institute, Indonesia
t.sarbunan@iaknambon.ac.id
https://orcid.org/0000-0001-8236-370X

Abstract

The research pathway is also an important point to lead researchers in creating and enriching knowledge from a fresh viewpoint, as well as development for the human race. The frontier is the publishing house of a publication that has established information along with the 'other agent' of knowledge around the globe. As a result, one of the sub-journals of this publication was education, expanded awareness time by time, by new information on innovation in science and technology. In the meantime, the pandemic, better than the science society, has alerted to the current developments in science aimed at strengthening and gaining some insight and awareness of how to maintain the 'mode of knowledge creation'. So, through this discussion of the current edition of Frontier Education Journals, I thought that this discussion theoretically involved encouragement and advancement in the middle of the pandemic, also influenced from a general point of view, here as roadmap or step-stone for all research and innovation researchers. On the basis of the discussion in general, I saw that the road map of the topic of frontier education is in significance to all branches of expertise of education. I agree that knowledge development time-by-time needs to be reflected-analysed-synthesized-adopted or adapted-also developed for the purpose of education in addition to learning from a general viewpoint. Note, knowledge is never-never sleeping tight, but it still evolves and progresses a long period with the newest scientific ideas-concept-and hypothesis. In the other hand, it is possible that my study would miss a range of weaknesses in literacy resources as well; but at least, I have sought, through this article, to see the importance of knowledge advancement that can enrich knowledge in the middle of the pandemic and for future studies.

Keyword: First to Eleven December, Frontier Education Journals, Latest Edition Articles, Research Pathway, Related to Pandemic Education

Introduction

The natures of research only go around to assert about proving-renewing-duplicating-last is an innovation. According to (Chery et al., 1999) such "an action research, explores the layers and strands of work that are involved in the method; - offers a practical guide to uncovering the issues which arise from the method; - reviews the status of that method relative to other research methodologies; - explores the notion of subjectivity; - describes other ways to strengthen the extent to which the findings of action research can be generalised. The Qualitative Research Methods series is intended primarily to assist postgraduate research students in understanding the different qualitative research methods and to enable students to choose the most appropriate method for their particular research. Each monograph will also provide guidance on conducting research throughout candidature", say scholars. In other scientific field, for example politic, "the pathway of research is aim to reinvigorate the service to support more robust political" (Walker, 2002). Therapeutic research, based on (Baig et al., 2016) this scholars claimed that "research pathway is used to address the agents (drugs) and therapeutic strategies adopted to target these specific proteins/pathways that have entered clinical trials".

The glances of educational research reflected "with the identification of a priority issue for subsequent iterations of the Pathway and a reflection on the shift in my role as a teacher in this Pathway from 'teacher researcher' to 'scholarly teacher'" (Diezmann, 2005). Moreover, Lipner et al. (2012) argues in this study, "research pathway training did not adversely impact internal medicine certification status. Although the scores of physicians who followed the research pathway were slightly lower, the effect size was small. In a subset of research pathway physicians, 63% remained in academic medicine and 37% continued to spend a substantial portion of time in medical research 10 years later. In conclusion, stated that the different training pathways can lead to similar achievements in clinical judgment. The educational model, competency-based rather than time-dependent, that works for research pathway physicians could be extended to other talented trainees who would benefit by customizing training to meet career goals". Added by (Wallner et al., 2013) "trainees remained in academic practice and demonstrated significant academic productivity as measured by manuscript authorship and research support".

Once again emphasized by (Blanchard et al., 2015) the important of "creating an adequate career path, for clinician educators to become education research mentors; this action is necessary in order to encourage progress in medical education. Developing highly trained researchers ensures mentorship for continued high-quality, necessary for robust innovations in medical education and patient care". Another highlight showed that "the development of pedagogical content knowledge relevant to Education for Sustainability during the pre-service years can play an integral part in an individual's decision-making when teaching" (Kennelly et al., 2008). Adomßent et al. (2014) claims "management education for sustainable development, sustainable consumption in higher education institutions, and higher education for sustainable development in Central and Eastern Europe can be considered as three highly relevant emerging areas in research on higher education for sustainable development. So indeed, that sustainability is a priority issue in research, education, operations and community outreach that requires strategic leadership. The work is valuable to lecturers, teaching staff, deans, directors and other senior staff; education may come under suspicion of collaboration with the overthrown regime. At the same time, supranational power can be a productive drive; similar processes at the interface of culture and policy-making can be observed in other parts of the world. Hence, the important of higher education sustainable development that seriously related to research development is tangible into three main aspect; first, Measuring learning outcomes; second, Accounting for different geographical, political and cultural contexts; third, Understanding organisational change processes". "Providing quality education is a complex undertaking partially because the concept of quality in education is continuously evolving, but additionally the term quality education has many interpretations and is sometimes synonymous with school improvement or school effectiveness. Moreover, three models of quality education are predominant in the international educational literature: the economic model of education deals with inputs and outputs; goals of education include wider social goals (e.g., human rights, social justice and democracy) and personal goals; Incorporating local issues is part of the learning as connection model of quality education in which everyday knowledge is brought into relationship with abstract and academic concepts so that both can grow together" (Laurie et al., 2016) .

Åkerlind (2008) says "four qualitatively different ways of understanding research development emerged: (1) Becoming confident as a researcher; (2) Becoming recognised as a researcher; (3) Becoming more productive as a researcher; and (4) Becoming more sophisticated as a researcher. The last three categories are seen as relevant to all career stages, including more advanced stages as well as the early stages of a research career. Comparisons between academics' ways of understanding their growth and development as a university researcher and as a university teacher are also presented". Orlikowski & Iacono (2001) were strongly agrees about "the field of information systems is premised on the centrality of information technology in everyday socio-economic life. Also, scholars believe that such a research direction is critical if research is to make a significant contribution to the understanding of a world increasingly suffused with ubiquitous, interdependent, and emergent information technologies". In relation, drawing the reader into the research with a focus on a topic of significance and at the same time functioning as lenses that are directed outward by the researcher to capture the nuances of the lives, experiences, and perspectives of others" (Agee, 2009).

Simultaneously, the great idea stated "scholars must pay more attention to topics that extremely excluded to the mainstream within the field but are of great importance to developing countries" (Ramamurti, 2004).

Unquestionably logic flow derived from (Pipere et al., 2015) that stated to achieve its goals, research in any discipline needs to be disseminated both locally and globally, and for novel fields of study, the establishment of academic periodicals designates a certain maturity and illustrates striving towards academic quality and recognition. Another important is Scholarship in the field seeks to describe, understand, and explain how learning takes place throughout a personís life and how formal and informal contexts of education affect all forms of learning. Currently, it seems that the academic community of educational research values empirical research higher than theoretical work. Some scholars admit that educational research that is based on the empirical traditions of the social sciences should be distinguished from research grounded in the humanities. But, for (Segrott et al., 2006) this scholars proved that "two main challenges affecting research capacity development were identified about the material constraints and organisational contexts, and the changing roles and expectations. The importance of developing an overall strategic approach, clearly communicated, and accompanied by effective leadership was a point of common agreement. Debate existed on how research support should be managed, particularly the merits of inclusivity and the reconcilement of individual and organisational needs. Specific capacity strategies identified in the literature were the creation of infrastructures, the fostering of research cultures and environments, and the facilitation of training and collaboration". Makel & Plucker (2014) admits however, "replications were significantly less likely to be successful when there was no overlap in authorship between the original and replicating articles. The results emphasize the importance of third-party; direct replications in helping education research improve its ability to shape education policy and practice".

Based on the argument and finding of (Foster et al., 2015) showed that "what factors affect a scientist's choice of research problem? Qualitative research in the history and sociology of science suggests that this choice is patterned by an 'essential tension' between productive tradition and risky innovation. In addition, the aggregate distribution of published strategies remains remarkably stable. High-risk innovation strategies are rare and reflect a growing focus on established knowledge. An innovative publication is more likely to achieve high impact than a conservative one, but the additional reward does not compensate for the risk of failing to publish". Opposite to (Cropley, 1999) "the cognitive approach to creativity emphasizes the processes involved in producing effective novelty, as well as the control mechanisms that regulate novelty production, and the structures that result. Merely novel structures display surprising-ness and incongruity, to be sure, but they must also be meaningful and practicable to be effective. There are no special processes or control mechanisms unique to the production of effective novelty, but meta-systematic operations are particularly favourable for it. Effective novelty can be produced at lower levels of cognitive development, but children's creativity is likely to differ qualitatively from that of adults. Although the cognitive approach takes little account of motivation, personality, or the social environment, it provides the powerful operation definition of some aspects of creativity, and offers insights into what needs to be fostered to promote it". Hostetler (2005) suggests "the question of what counts as good education research has received a great deal of attention, but too often it is conceived principally as a methodological question rather than an ethical one. Good education research is a matter not only of sound procedures but also of beneficial aims and results; our ultimate aim as researchers and educators is to serve people's well-being. There is a good deal of history and convention against such a conception of researchers' work. As a scholar and practitioner are need to consider about the conditions needed if that conception is to be realized. Among the conditions is a concerted and cooperative endeavour for moral education among researchers and the people with whom they work—a context where questions of well-being are foregrounded, welcomed, and vigorously debated".

Continuously, another valuable point, such as (Reinking & Yaden, 2020) said "literacy research would be more productive if researchers had a clearer, more nuanced understanding of theory. Specifically, we argue that theory in a practice-oriented field is most fundamentally productive when

it provides instrumental guidance for literacy beyond academic understanding about literacy. Premises for that argument are presented, as well as how productivity connects to an instrumental view of theory within the philosophy of science. In further, productivity could be a unifying construct to ameliorate and limitations". Snow (2016) says "education research could only distinguish itself from research in the disciplines through attention to improving educational outcomes, however challenged education researchers simultaneously to build knowledge and offer solutions to practical problems. Therefore, current research-practice partnerships and shifts toward practice-embedded research support. But only if the larger education research enterprise supports these efforts will the shift be radical and robust enough to persist and survive". Related to the current circumstances like pandemic at this time, (DeMatthews et al., 2020) said "education researchers have been impacted by COVID-19 as school closures interrupted ongoing education research, including clinical trials, case study and ethnographic inquiry in schools, and longitudinal studies using federal, state, or district administrative data. Immediate and future actions education researchers can take to support not only for public health but also touching the educational institutions dealing with a pandemic. Clearly not exhaustive, our recommendations are intended to prompt the education research community to collectively consider how the field's efforts can both inform the knowledge base and support frontline educators".

My paper discussed the newest issues that frontier house of publication already release in press. I knew that frontier have been developing as the largest reputable journal house of publication, and promoted the development of literacy to become meaningfully, therefore, I divided the discussion according to the edition content from the first to eleven December 2020, and talked about education field. Besides that, these research papers of frontier publication contended of various types of research paper structure, which absolutely deemed to the writing requirement of frontier papers also the reputable world class paper standard in other scientific journal publication house such as Tylor & Francis, Schimago and Elsevier. Moreover, my state-of-the-art review considers basically the most cutting-edge lookup in a given area or regarding a given topic. It regularly summarizes contemporary and rising academic trends, lookup priorities and standardisations in a particular area of interest. The overview goals to furnish essential information of the significant literature produced in previous research, a synthesis of cutting-edge thinking in the field. It gives new views on an issue or factors out an area in need of further research.

Table 1
List of Related Topic of Frontier Education Edition around First to Eleven December 2020

Factors and Recommendations to Support Students' Enjoyment of Online Learning with Fun: A Mixed Method Study during COVID-19
Teacher Practices, Peer Dynamics, and Academic Enablers: A Pilot Study Exploring Direct and Indirect Effects among Children at Risk for ADHD and their Classmates
Monitoring Communication Development between Teachers and Their Students with Congenital Deaf blindness: An Application of the Layered Communication Model
Connecting Judgment Process and Accuracy of Student Teachers: Differences in Observation and Student Engagement Cues to Assess Student Characteristics
Do Service Learning and Active-Citizenship Learning Support Our Students to Live a Culture of Democracy?
Examining the Efficacy of E-Service-Learning
Reflecting on Social Learning Tools to enhance the Teaching-Learning Experience of Generation Z Learners
Reflection and Quality Assessment in Service-Learning Projects: When, with whom and why.
Practical Rubrics for Informal Science Education Studies: (1) a STEM Research Design Rubric for Assessing Study Design and a (2) STEM Impact Rubric for Measuring Evidence of Impact Keep Safe, Keep Learning: Principals' Role in Creating Psychological Safety and

1. Flexible Teaching and Learning

Goode et al. (2007) said "flexible teaching and learning is not a new concept, but it is one that we, as educators, do not focus on enough. Designing and delivering innovative, exciting and relevant learning experiences is needed if we are to make our classes good learning experiences. Information systems (IS) educators deal with technology every day, yet we are sometimes the first ones to forget how to use it in the classroom. Educators must recognize the importance of increasing student control over and active participation in their own learning". Bigum & Rowan (2004) stresses "the concept 'flexible learning' within various educational environments—and equally frequent references to the flexible 'natures' of the computer and communication technologies that often underpin flexible learning initiatives—the relationship between technologies and flexibility is not a simple one. In this paper we examine some of the more persistent myths about technologies that are intertwined with discourses of flexibility". Errington (2004) agrees "teachers' beliefs about flexible learning delivery have an impact on what can be achieved. Flexible learning innovations acceptable to one staff member may not necessarily be acceptable to another. Academic developers can help teachers address and modify negative beliefs about innovation. The idea of 'flexible learning' supports a 'sage on the stage' model, as opposed to the 'sages on the stages' model". However "the key challenges for achieving flexibility in flexible mode programs in engineering and technology include the integration of explicit and implicit content in modules across the whole program curriculum" (Palmer, 2001).

Collis & Moonen (2002) thinks "flexible Learning in a Digital World: experiences and expectations is about changes in learning, teaching, the support and enterprise of education, and the role of technology in those changes. It considers these changes in a broad and integrated way using flexible learning as the integrating concept". Neill & Etheridge (2008) argues "to support pedagogical innovation, educators must re-examine physical space. This paper describes a project to redesign an existing classroom into a flexible learning space. The desired outcome was a classroom that would support a variety of pedagogical approaches and learning experiences. The renovated classroom increases student engagement, collaboration, flexibility, and learning. A flexible learning space better enables innovative approaches to teaching and learning when compared to the traditional classroom". Kirkpatrick (2001) says "flexible learning has been embraced by higher education for a number of reasons. However, universities' adoption of flexible approaches, particularly those incorporating information technologies has not been unproblematic. While flexible learning promises many advantages for the institution and students, it has received a mixed and often negative reaction from academics. Even in institutions with a tradition of distance education provision the introduction of flexible approaches to learning that incorporate new technologies have not been unproblematic. university-wide programme of academic staff development which sought to familiarize staff with technologies and the appropriate use of technologies in teaching and to support them as they adjusted to changing roles and practices in the shift to flexible teaching and learning. The programme combined multiple approaches to address the needs of new and experienced staff and to provide training and support in technical dimensions of teaching along with technologies and pedagogical considerations". Lundin (2012) believes "the rapid growth in flexible delivery of open learning and teaching through the use of interactive communication technologies poses significant questions relating to resource allocations, different learning environments, more demanding time constraints, the role of the teacher and new modes and techniques of communication. It is also evident that there has

evolved a number of different terms for this new, rather deregulated approach to education and training, and that there is much talk of a new paradigm; in addition The major areas that will impact on flexible delivery of professional development are associated with: changing role of the provider; globalisation; deregulated climate for advanced education and telecommunications; compulsory continuing professional development; increased technological options; and virtual learning''. This scholar proposed decision-making model framework that supported flexible teaching and learning, which generated in the table below.

Table 2
Decision-Making Model

Assess the needs of the participants/clients and practitioners:
• Personal needs: age, gender, abilities, learning styles, nature of employment and work patterns,   • home responsibilities, nature of isolation, other special personal needs;   • Professional needs: program relevance, experience and qualifications, present knowledge level;   • Access needs: location, distribution (geographic), disability, number of participants/practitioners;   • Choice: types of programs/courses/services available, place, pace, time, timing, duration, individual or cohort preference.
Clarify the objectives of the program, nature of the processes and the relevance of the content:
• Interaction and participation needs: level and type of interaction required among the participants such as live (i.e. synchronous, immediate/real time) versus delayed (asynchronous) interaction, level and type of supervision required, number of participants/practitioners;   • Teaching/learning strategies most appropriate for the content and objectives; and   • Content demands: need for audio, need for visual component (e.g. still graphics, colour and motion), type of knowledge, skills and attitudes needed to be acquired and/or demonstrated.
Consider the choice and skills of the practitioners:
• Confidence and skills in particular mode of delivery;   • Program strategies chosen as most appropriate;   • Support available.
Determine the feasibility of the program:
• Access to equipment and systems for production and delivery, by participants/practitioners;   • Costs and availability of funds;   • Local support for participants (e.g. local site co-ordinator, training in the use of the technology, learning centres, information);   • Institutional support (e.g. library services, production services, administration services).

Ryan (2013) reports "institutional initiatives for curriculum change linked to flexible pedagogy themes are more likely to succeed with the adoption of 'systems' approaches. Flexible learning imperatives set an urgent pedagogical challenge that requires Higher Education to respond. New ideas will help to reorient academic practices and systems so that [HE] institutions can better fulfil their responsibilities as beacons for social change". In addition, this literature focused on the

substantial concept of consultation input: the assessment of flexible pedagogy, as can be seen in the figure below.

Senior lecturer	Professor	Senior lecturer	Director of teaching and learning
"The problem I have is that if you go to colleagues and ask if they are delivering all this, they would say they are, at teacher level - how do you say, from a flexible pedagogy point of view, you're not already doing this! People don't always appreciate that assessment then drives the pedagogy - and in terms of innovation, this is the issue. Thinking more holistically is one of the great challenges of a modular scheme. Where is the holistic part of the curriculum? Where do students get an opportunity to be more holistic in their thinking?"	"We need to start with focusing on validating outcomes (here we would argue that graduates should be 'work ready plus', where the 'plus' can include graduates being sustainability literate, change implementation savvy and having a considered position on the tacit assumptions driving the 21st-century agenda — eg growth is good, consumption is happiness, ICT is the answer and globalisation is great) and then determining how to most validly assess the development of these capabilities. Only after this is sorted do we look at the most flexible and responsive learning design to enable students to develop the capabilities (outcomes) sought and an aligned support and delivery system."	"Flexible pedagogy is about participation not performance … Failure is an important part of learning and we tend to stress achievement or attainment rather than learning. Students and staff are emotionally and intellectually restricted accordingly. We have strict learning outcomes but little room for expressiveness, we have team work rather than group association and problem solving rather than problem exploration or, except in a few cases, genuine inter-disciplinary or trans-disciplinary problem-based learning …. We need a democratic learning culture in HE not a performative culture."	"The tyranny of the modular structure forces us to have these micro outcomes that we strive to assess and strive to write feedback against, but we just write the programme outcomes as if they were some vague rationale that is there because the form requires it — and we don't assess to them and we don't typically design the curriculum to them. There are great exceptions to that, but I've seen so many programmes that are fragmented — and then you say 'how do you actually deliver this programme' and you get an absolutely blank expression on everybody's faces … If we could actually shift the balance that way, that I think would make a difference."

Figure 1
Consultation input: assessing flexible pedagogies

Further argument came from (Edwards & Clarke, 2002) and said "descriptions and definitions of flexible organisations and flexible learning programs seem to imply that the processes of teaching and learning can be liberated from the constraints of time and place. This flexibility results in a supply of lifelong learning opportunities where learners can learn at a time and in a place convenient to the learner and teacher. For some, the notion of a de-territorialised lifelong learner, consuming learning opportunities where and when they desire, might have a certain attraction". Li & Wong (2018) acknowledges "for decades, flexibility has been a focus of attention and efforts in the field of education. Flexibility in learning, which emphasises student choice, has been considered one key to enhancing education quality and satisfying highly diverse student needs. It is often associated with the terms 'open learning', 'distance learning', and 'e-learning'. With the increasing application of information and communication technologies in the field of education, flexible learning has been especially closely associated with e-learning and sometimes is considered to be the essence of the term. Indeed, the term 'flexible learning' is redefined with an aim to clarify its relationship with relevant terms and a proposed system of its dimensions". In practice, to support flexible learning, X. Li et al. (2020) claims "universities face a growing demand for increased flexibility in response to different situations and groups that goes beyond the on-campus/online dichotomy. In Hong Kong, it is promising and urgent to use blended synchronous teaching and learning to facilitate flexible learning and global learning among university students. Through Applying blended synchronous teaching and learning; an approach solved the practical problems faced by the participants and facilitated flexible learning in higher education. The students indicated that the [BSTL] approach was useful in terms of convenience and in-depth learning. In addition, the instructors did not find this mode too complex or difficult to adopt. As a theoretical contribution, the [BSTL] mode was constructed based on the practice and reflection of action research. Blended learning usually refers to the integration of face-to-face learning experiences with online learning experiences. Using technology blended learning combines the advantages of traditional classrooms (real-time interactions with

teachers/classmates) and online learning (e.g., no time and space constraints) to meet the economic challenges of education and learners' personalized demand for flexibility. So, five basic elements of blended learning: the cyber classroom, the physical classroom, the teacher, the student, and a number of classrooms or participants. Depending on whether the cyber classroom and the physical classroom exist at the same time, blended learning is divided into synchronous and asynchronous modes". In accordance, "teaching in new kinds of learning environments could prove challenging, and a successful transition is facilitated by user involvement. The needs of pre-occupation evaluation of the flexible learning environment made teachers consider new ways of organising the existing activities. In many of today's schools, teachers teach a designated group of students in a traditional classroom that is furnished with desks and chairs and has many limitations when it comes to educational flexibility and affordances. When new types of learning environments are introduced educators often require new ways of organising the education that takes place in them and these need to be given proper consideration in order for the environment to function well. The staff culture also needs to be taken into account as a vital aspect of how teaching and the use of the learning environment are played out. The organisation is a core component in the school environment. This becomes even more crucial in open-plan learning environments because successful schools need to 'have a cohesive organizational structure that can sustain unconventional practices'. Moreover, teachers' focus on the social group dimension was an interesting result that is not, by and large, addressed in research on innovative learning environments. Teachers have a professional responsibility and accountability for educating students in a certain subject or subjects" (Frelin & Grannäs, 2020).

2. The Capacity of Teachers in Communication and Problem Solving

Supriyanto et al. (2020) frames the Covid-19 pandemic is affecting academic processes around the world and the emergence of problems in students. School counsellors have a significant role in helping problems and developing student potential through counselling services with digital technology media. Students need guidance and counselling services with the use of technology during the Covid-19 pandemic. Online collaboration and technological readiness have an impact on the success of students. The varieties of issues experienced by students are mental health problems, misinformation problems, educational problems, and coping strategy problems. These various problems require counselling services from school counsellors. Counsellors can provide individual counselling during the Covid-19 pandemic. Supported by (Mattsson, 2020) scholar claimed that "there is a heated debate on what teaching practices should be used to foster the skills students need for the current and future workplace. The 21st-century skills movement, among others, argue that 21st-century skills such as creativity, critical thinking, and collaboration should be actively taught to students using more modern teaching practices (for example students working in small groups and focusing on critical thinking) and less traditional teaching practices (for example lecturing and focusing on fact-based knowledge)".

Dewi & Prahani (2017) stresses "Indonesian researchers developed a learning model based on local wisdom. The growth of science and technology has triggered the destruction of society. Theory of information processing shows problem solving skills based on general problem solving skills and artificial intelligence. Cognitive psychology shows problem solving as a process that includes introspection, observation, and the development of heuristics. Developing cognitive psychology as a discipline, interest and effort geared toward the mental processes of learning and problem solving. An early cognitive approach to problem solving is to identify mental stage and continued with the problem solving. Learning problem solving depends on the processing of students in four process comprises: (1) attention, the process of allocating cognitive resources on the stimulus or task exists and is a necessary condition for the transfer of information to be learned into the working memory, (2) retention, process given the observed behaviour and then transferred to the working memory, students need to encode information by creating a visual representation of verbal or experience in long-term memory, (3) production, converting a mental representation that is created during the encoding into motor activity. This process is done by splitting the procedure is learned to be steps smaller and provides many training opportunities are

accompanied by feedback to guide, and (4) motivation, students need to be motivated to learn from the model and to reproduce what they have learned. Noted, in communication skill, Humans use language to communicate ideas, thoughts, and feelings verbally and nonverbally. Communication easier for students to obtain information or new ideas that can help them understand a concept or problem. Social constructivist learning theory emphasizes the social context of the rules in building knowledge through social interaction with teachers or other students. Learners divide individual perspectives with others to build a common understanding. The thought process occurs individually and collaboratively, so that test a variety of opinions is necessary so that the ideas of individuals can develop better. Vygotsky insists on rules that facilitate social interaction in the cognitive development of learners. Social constructivists believe that each student will build knowledge that is different from the material the same instructions. Explain the process knowledge to others will involve social activities where ideas are explored through dialogue, involving collaborative group discussions. The ability to communicate depends on scientific talent, but communication skills can be learned through a learning process". Added by (Nickerson, 1994) "helping students to become better thinkers and problem solvers is an old quest in education; the current interest in finding ways to pursue this objective more effectively appears to be widespread and fairly intense. In the aggregate, the results of numerous efforts to enhance thinking and problem solving through classroom instruction, and findings from the last few decades of research on cognition and learning, provide a basis for optimism that suggests that progress is being made. However, designing an educational process that will develop competent thinkers and problem solvers is ambitious and something that requires a lot of thinking and research. More research focused on questions that have clear relevance to thinking and problem solving in everyday life is needed, as is greater two-way communication between the worlds of educational research and educational practice. There is also a continuing need for reflection on, and discussion of, what it means to think well and what the specific objectives of efforts to enhance thinking ability should be".

Bakic-Tomic et al. (2015) accords "teachers participate too often in problem-solving instead of trying to foresee changes; it is never too late to learn how to communicate. To re-educate means to awake a new dimension, called spirit, into thinking and acting. This way a teacher will be transformed into a dharmic teacher, in addition, which means to act and teach with the inner truth". Strengthen this point of discussion, I took from (Greenhill, 2010) that developed the literacy from the perspective of 21st century interdisciplinary theme and learning innovations skill. Therefore scholar described, first, academic subject areas, 21st century interdisciplinary themes are equally important in promoting understanding of academic content at much higher levels. "These themes include: • Global Awareness, e.g. understanding global issues, other nations and other cultures; • Financial, Economic, Business and Entrepreneurial Literacy, e.g., knowing how to make economic choices, understanding the role of the economy in society; • Civic Literacy, e.g. learning how to participate effectively in civic life-exercising the rights and obligations of citizenship; • Health Literacy, e.g., obtaining, interpreting and understanding basic health information and services; understanding preventive physical and mental health measures; • Environmental Literacy, e.g., demonstrating knowledge and understanding of the environment and the circumstances and conditions affecting it; taking individual and collective action towards addressing environmental challenges. And second, learning and innovation skill for example: first, Critical Thinking and Problem Solving, e.g., effectively analyse and evaluate evidence, arguments, claims and beliefs; solve different kinds of non-familiar problems in both conventional and innovative ways; second, Communication, e.g., articulate thoughts and ideas effectively using oral and written communication skills in a variety of forms and contexts; third, Collaboration, e.g., demonstrate ability to work effectively and respectfully with diverse teams; fourth, Creativity and Innovation, e.g., use a wide range of idea creation techniques to create new and worthwhile ideas". Johnson (2019) adds "the educators have been quite engaged in implementing the education that they do not remember 'how' the curriculum is delivered".

KARAKOÇ & DEMİR (2020) claims "thinking skill is a skilled field that can be taught besides being a talent. In environments where educational processes are carried out, using the reflective

thinking method, teachers should also be able to teach thinking critically, showing their productiveness, acting in a solution-oriented manner, as well as progress in teaching point; focusing on problem-solving skills and the problem itself in the process of reflective thinking. In reflective thinking, which is important in the education and training processes, the student or prospective teacher or teacher enters into a conscious and active process by concentrating on problem-solving. Importantly, evaluate the scientific-ness of problem-solving as a method and emphasize the necessity of using critical and reflective thinking skills perceptions in order to solve a problem. In terms of problem-solving skills perceptions, having this skilled field is what makes a person different in society". Vanek (2017) proposes "general perspective of employable ability, and explained that "this process identified the skills that support employability. The top five were, in this order" moreover it covered of: 1. Judgment and Decision Making; 2. Complex Problem Solving; 3. Active Learning; 4. Reading Comprehension; 5. Critical Thinking". In order to look in depth about the framework of problem solving, as (Kirkley, Jamie, Foshay, Rob, 1998) explained that "guided by recent research in problem-solving, changing professional standards, new workplace demands, and recent changes in learning theory, educators and trainers are revising curricula to include integrated learning environments which encourage learners to use higher-order thinking skills and in particular, problem-solving skills. Therefore, one example of this general problem-solving model is Bransford's IDEAL model: 1) Identify the problem; 2) Define the problem through thinking about it and sorting out the relevant information; 3) Explore solutions through looking at alternatives, brainstorming, and checking out different points of view; 4) Act on the strategies; 5) Look back and evaluate the effects of your activity. Besides that the characteristic of problem solving for example 1) Problem solving is cognitive but is inferred from behaviour; 2) Problem solving results in behaviour that leads to a solution.; 3) Problem solving is a process that involves manipulation of or operations on previous knowledge". Further explanations from these scholars are the problem solving occurred on a basic sequence of three cognitive, first: Representing the problem includes calling up the appropriate context knowledge, and identifying the goal and the relevant starting conditions for the problem. Second: Solution search includes refining the goal and developing a plan of action to reach the goal. And the third: Implementing the Solution includes executing the plan of action and evaluating the results".
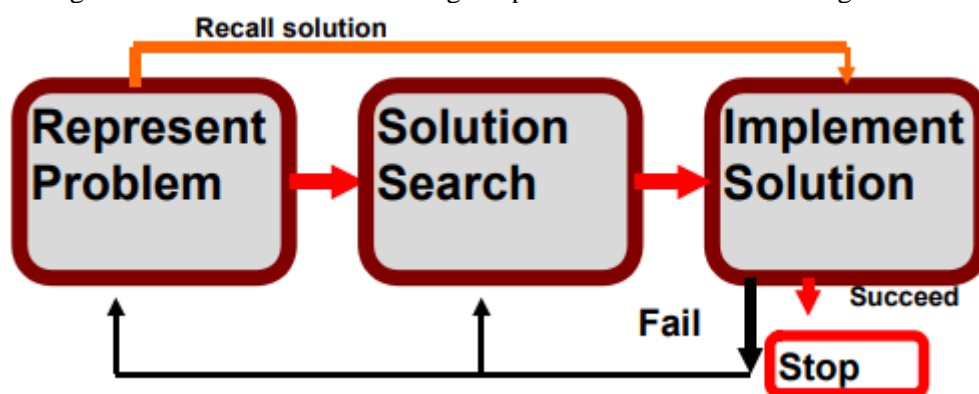

Figure 2
A Basic Sequence of Three Cognitive of Problem Solving

While Sarason (1978) says "the nature of scientific problem-solving has been assumed to be appropriate to all problems, including those in the social realm. There are no intractable problems. If problems in the social realm seem intractable, it is assumed that it is because they have not been formulated and attacked scientifically. The social scientists that entered social action after World War II, armed with theories and scientifically tested knowledge, found a world that would not bend to their paradigms. They entered a world governed by values, not facts, where persuasion and power were in the service of different definitions of age-old questions, where the relationship between action and values was more crucial to living than was the requirement that action lead to a solution. Many social scientists reacted with either petulance or bewilderment, and their attempts at social change fared poorly. A malaise set in, a crisis of confidence''. Carlson & Bloom (2005) evaluates "although many studies have investigated and compared the

characteristics of novice and expert problem solvers, many aspects of the problem-solving process still do not appear to be understood. While the literature supports that control and metacognition are important for problem solving success, more information is needed to understand how these behaviours are manifested during problem solving, and how they interact with other problem solving attributes reported to influence the problem solving process (e.g., resources, heuristics, affect). Twenty-five years later, another expert described problem solving behaviour as consisting of four phases of distinctly different metacognitive activities: orientation, organization, execution, and verification. In describing the framework, indicated that shifts from one phase to the next commonly occurred when metacognitive decisions resulted in some form of cognitive action". In supports idea, Chow & Yeung (1995) argues "expert system has gone through several shifts in view, from search-based to knowledge-based problem solving and from knowledge transfer to knowledge modelling. However, knowledge is still mostly treated informally. There are widely different opinions on its nature; so these scholars proposed to in depth of analysis about multidimensional knowledge structure''.

According to (Lester, 2013) "problem-solving is an activity requiring a variety of cognitive actions; each of which requires some knowledge and skill; these cognitive actions are influenced by a number of non-cognitive factors. A useful description should acknowledge that problem solving is a complex activity. Successful problem solving involves coordinating previous experiences, knowledge, familiar representations and patterns of inference, and intuition in an effort to generate new representations and related patterns of inference that resolve some tension or ambiguity (i.e., lack of meaningful representations and supporting inferential moves) that prompted the original problem-solving activity. So, to be a successful problem-solver, an individual must have ample relevant experience in learning how to solve problems, strong content knowledge, proficiency in using a variety of representations and a solid grasp of how to recognize and construct patterns of inference. Moreover, it recognizes the importance of intuition in successful problem-solving. With the possible exception of intuition, each of these ingredients should be attended to any program aimed at equipping prospective teachers with the proficiencies needed to teach mathematics either for or via problem-solving; particular method of metacognition instruction over another". English (2008) explains "longstanding perspectives on problem solving have treated it as an isolated topic, where problem solving abilities are assumed to develop through initial learning of concepts and procedures followed by practice on 'story problems', then through exposure to a range of strategies (e.g., "draw a diagram," "guess and check"), and finally, through experiences in applying these competencies to solving 'novel' or 'non-routine problems'. When taught in this way, problem solving is seen as independent of, and isolated from, the development of core ideas, understandings, and processes. Despite these decades of research and associated curriculum development, it seems that students' problem solving abilities still require substantial improvement especially given the rapidly changing nature of today's world".

In supporting the discourse of problem-solving, Khotimah & Masduki (2016) says "it is a good to look the principle of the development of contextual learning that plausible related to problem-solving. Therefore, seven principles in the development of contextual learning; 1) constructivism: the condition where the students' knowledge is constructed based on the experiences they encounter; 2) inquiry: a learning process based on seeking and discovering through systematically thinking process; 3) questioning: learning basically is a process of asking and answering questions; 4) learning community: an individual's knowledge and understanding is supported by communication with others; 5) modelling: in contextual learning, teacher is not the only model in the learning process; 6) reflection: a deposition process of experience the students have encountered by rearranging the learning events or occurrences they have experienced; 7) authentic assessment: the success of learning process is not determined solely on the development of intellectual ability, it should also include the development in all aspects as the criteria of learning success".

3. An Appropriate Schema for Teaching and Learning through Online Approach

Ward & Benson (2010) analyses "a comprehensive view of the online teaching and learning process is needed; the TPACK (Technological, Pedagogical, and Content Knowledge) framework explains the complex relationship between content, pedagogy and technology knowledge. Understanding TPACK may help instructors develop a new Schema for transitioning from face-to-face to online teaching. The TPACK model is useful as a framework in the online higher education classroom. Most higher education instructors do not have a history of learning in online environments; for higher education instructor [HEI], learning took place at desks in rows, traditional classrooms, and instructor-focused lecture halls. Scholars suggested using following actions to develop online courses".

Table 3
Actions to Develop Online Course

Develop new schemas for online learning by understanding the dynamic TPACK framework. Understanding the TPACK module through reading, learning modules, and discussion will extend instructors' schema and initiate the process of accommodation. New content, pedagogical, and technological knowledge will align with existing knowledge.
Become learners in online environments. Enrol in an online class as a learner to see what it really feels like! Auditing the class of a colleague can also serve this purpose. Similar to auditing a face-to-face class, many course management systems permit "outsiders" to sit in on a class as an observer. Participating in an online class in this fashion will provide potential and novice online instructors also the opportunity to experience and reflect upon the online teaching and learning experience.
Begin the process of new online course development by first considering content and pedagogy. Clearly articulated learning outcomes and effective instructional strategies presuppose the integration of technology. Self-assessment will become important as instructors begin to identify where their knowledge is strong and where they will need additional support. Professional development that focuses on a specific area of need, or working with a support team that includes instructional designers and collegial content specialists will be more effective than the generic, "one workshop fits all" professional development experiences.
Help students become competent consumers of online environments. When students understand how and why technology supports their learning, they will become more metacognitive and self-directed in their learning. An effective starting point can be the course syllabi. Syllabi typically include instructional objectives and instructional strategies. These two components can be aligned with course technology applications to demonstrate the relationship between content, pedagogy, and technology.

Emphasised by (KARIM et al., 2019) "the ubiquity with regard to technology and availability of social media offered an unorthodox avenue to impart education. Concerning language teaching and learning, the meticulous use of such online platforms has been overtly observed. Teaching and learning through online media become didactic concerning the issue that typical classrooms often exert gaps in terms of students' learning. The recent decade has experienced constant discussions subject to the knowledge-based economy that has proliferated pervasive and ever-increasing demand for innovative ways to impart education. Subject to these radical changes in terms of learning needs and technology, a transition has been fuelled in modern learning in the era of the Internet, called e-learning. The past few years have been identified as the time for culminating e-learning as a potential solution to 'lifelong learning and on-the-job workforce training'. More specifically, e-learning orients technology in learning in which learning materials

are disseminated electronically to learners living in the fringe areas via the computer network. Concerning to the two face of online learning, better than education society take a look for the table below, that describe the distinguishes of both learning approach".

Table 4
Traditional and E learning Approach; The Distinguishes

Advantages and Disadvantages	Traditional classroom learning	E learning
Advantages	- Immediate feedback - Being familiar to both instructors and students - Motivating students - Cultivation of social community	- Learner-cantered and self-paced - Time and location flexibility - Cost-effective for learners - Potentially available to global audience - Unlimited access to knowledge - Archival capability knowledge reuse and sharing
Disadvantages	- Instructor-cantered - Time and location constraints - More expensive to deliver	- Lack of immediate feedback in asynchronous e-learning - Increased preparation time for the instructor - Not comfortable to some people - Potentially more frustration, anxiety and confusion

Carwile (2007) argues "research about effective pedagogy in the online environment is still in its infancy. Two major classifications of models are objectivism and constructivism. Constructivism posits that knowledge acquisition occurs amid four assumptions. The cooperative/collaborative approach and socio-cultural model are two approaches to learning. Online facilitators serve their students in three important ways, including setting objectives, procedural rules, and timetables. Also scholar stresses the importance of an active learning environment for online students, built on these recommendations: • Learning should take place in authentic and real-world environments. • Learning should involve social negotiation and mediation. • Content and skills should be made relevant to the learner. • Teachers serve primarily as guides and facilitators of learning, not instructors. • Teachers should provide for and encourage multiple perspectives and representations of content. • Content and skills should be understood within the framework of the learner's prior knowledge. • Students should be assessed formatively, serving to inform future learning experiences. • Students should be encouraged to become self-regulatory, self-mediated, and self-aware. Inherent of constructivist approach that implied in online learning can be seen as like: first, prompting students to develop their own inquiry questions; second, allowing students to express their knowledge through multiple avenues; third, encouraging group projects and collaborative learning". In respond to-what previous scholar says, based on (Lawless & Pellegrino, 2007) this scholars said "the literature base on technology professional development for teachers reveals that there is a long way to go in understanding methods of effective practice with respect to the various impacts of these activities on teaching and learning".

Yang & Cornelius (2004) proposes "online education has the following features: (a) it provides a learning experience different than in the traditional classroom because learners are different, (b) the communication is via computer and World Wide Web, (c) participation in classroom by learners are different, (d) the social dynamic of the learning environment is changed, and (e) discrimination and prejudice is minimized. While scholars added that online education is characterized by: the separation of teachers and learners (which distinguishes it from face-to-face education); the influence of an educational organization (which distinguishes it from self-study and private tutoring); the use of a computer network to present or distribute some educational content; the provision of two-way communication via a computer network so that students may benefit from communication with each other, teachers, and staff". Picciano (2017) defines an online learning from several related theories; the theories can be seen on table 5. "However, a number of theories and models have roots in one or more of the above frameworks. In the latter part of the 20th century, the major learning theories, especially cognitive theory and social constructivism began to overlap. One of the more popular and controversial theories relates to learning styles and posits that individuals learn differently depending upon their propensities and personalities, to argue that perspective, theory focuses on four basic psychological dimensions: first, Extroversion vs. Introversion; second, Sensation vs. Intuition; third, Thinking vs. Feeling; and four, Judging vs. Perceiving. Based on that chaos, modern neuroscience research also suggests that students learn in different ways depending upon a number of factors including age, learning stimuli, and the pace of instruction; because of learning is a dynamic process that may evolve and change from one classroom to another, from one subject to another, and from one day to another. So, to support the modern neuroscience argument, several theories specifically related to online education will now be examined, that assisted an educator to accelerate when classroom examined: 1. Verbal-linguistic intelligence: well-developed verbal skills and sensitivity to the sounds, meanings, and rhythms of words; 2. Logical-mathematical intelligence: ability to think conceptually and abstractly, and capacity to discern logical and numerical patterns; 3. Spatial-visual intelligence: capacity to think in images and pictures, to visualize accurately and abstractly; 4. Bodily-kinaesthetic intelligence: ability to control one's body movements and to handle objects skilfully; 5. Musical intelligences: ability to produce and appreciate rhythm, pitch, and timber; 6. Interpersonal intelligence: capacity to detect and respond appropriately to the moods, motivations, and desires of others; 7. Intrapersonal intelligence: capacity to be self-aware and in tune with inner feelings, values, beliefs, and thinking processes; 8. Naturalist intelligence: ability to recognize and categorize plants, animals, and other objects in nature; 9. Existential intelligence: sensitivity and capacity to tackle deep questions about human existence such as: What is the meaning of life? Why do we die? How did we get here".

Table 5
The Related Theories of Online Learning

• Learning theory is meant to explain and help us understand how people learn; however, the literature is complex and extensive enough to fill entire sections of a library. Therefore, involves multiple disciplines, including psychology, sociology, neuroscience, and of course, education. In particular, this theory comprised to three-part taxonomy: Explore: 'What exists?' and attempts to define [describe] and categorize; Explain: 'Why does this happen?' and looks for causality and correlation, and work with variables and relationships. Design: 'How do I achieve this outcome?' and describes interventions for reaching targeted outcomes and operational principles;
• Behaviourism: in education, behaviourism examines how students behave while learning. It evolved from a positivist worldview related to cause and effect. In simple terms, action produces a reaction. The emphasis in behaviourism is on that which is observable and not on the mind or cognitive processes. Further argument told that mind and consciousness are unimportant in the learning process and that everything can be studied in terms of stimulus and response;

- Cognitivism: has been considered a reaction to the "rigid" emphasis by behaviourists on predictive stimulus and response. Cognitive theorists promoted the concept that the mind has an important role in learning. Future of cognitivism is particularly interesting as more advanced online software evolves into adaptive and personalized learning applications that seek to integrate artificial intelligence and learning analytics. In addressing this theory, other psychologist asserted that nine events of instruction that occurred in cognitivism: first, gain attention: use media relevant to the topic. Second, describe the goal: provide clear objectives to the overall course goals. Third, stimulate prior knowledge: Review previously presented material and concepts and connect them to the material to be addressed in the current module; present the material to be learned: Readings, presentations, demonstrations, multimedia, graphics, audio files, animations, etc. Fourth, present the material to be learned: Readings, presentations, demonstrations, multimedia, graphics, audio files, animations, etc. Fifth, provide guidance for learning: discussions to enable learners to actively reflect on new information in order to check their knowledge and understanding of content. Sixth, Elicit performance: Activity-based learning such as group research projects, discussion, homework, etc. Seventh, provide feedback: Immediate, specific, and constructive feedback is provided to students. Eight, assess performance: Assessment activity such as a test, research project, essay, or presentation. The last is enhancing retention and transfer: provide opportunities for additional guided practice or projects that might relate learning to other real-life activities.
- Social Constructivism: learning is problem-solving and that the social construction of solutions to problems is the basis of the learning process; learning as a series of practical social experiences in which learners learn by doing, collaborating, and reflecting with others; so, an approach of integrating computer technology into problem-solving is easily applied to many facets of instructional design.

4. The Nature of Rubric Assessment

Wolf & Stevens (2007) says "a rubric is a multi-purpose scoring guide for assessing student products and performances. This tool works in a number of different ways to advance student learning, and has great potential in particular for non-traditional, first generation, and minority students. In addition, rubrics improve teaching, contribute to sound assessment, and are an important source of information for program improvement". While, Chowdhury (2018) argues "a rubric is a useful grading tool which can help instructors to grade students' work in a more consistent, reliable and unbiased manner. A well-designed rubric can help students to identify their strengths and weaknesses and be more objective about their own quality of work. Although some studies have examined the benefits of rubrics on student performance levels; nevertheless, research on rubrics is still at an early stage. A well-designed rubric is one that helps instructors not only to judge students' work effectively but also help students acquire certain skills and knowledge. Some teachers embrace rubrics and consider them as incredible tools for communicating expectations and grading students' written work. A rubric is a scoring tool that lays out the expectations of a task or assignment across 3 to 5 levels of performance. Rubrics can be used to state standards, instructional goals and objectives for the type of performances that students should be able to achieve while completing a task. Instructors use rubrics to divide assignments or tasks into different component parts, with a detailed description of each component reflecting what constitutes acceptable or unacceptable levels of performance. Instructors can construct various models of rubrics and use rubrics in their classroom for different purposes; however, rubrics are not suitable for all types of tasks. For example, they are not suitable in assessing test items where there is one specific, clear, correct answer". The table of number six, described about a list of indicators that can help instructors to understand when rubrics need to be utilized in the classroom.

Moreover, "types of rubric assessment in general understanding is comprised to three main structure, first, analytic; second, holistic; and third, task specific. In the case of analytic, each dimension or criterion is evaluated separately. A rubric, each dimension or criterion is evaluated separately. Analytic rubrics are good for formative assessments, but it takes more time to score tasks with holistic rubrics. Most educators recommend analytic rubrics for effective assessments. While, holistic, on the other hand, scoring can be faster with holistic rubrics, and this type of rubric is also suitable for summative assessments. Nevertheless, holistic rubrics provide a single

overall score that fails to provide clear information about where or how improvements can be achieved by the users. Though both types of rubrics can be used for classroom purposes, most educators recommend analytic rubrics for effective assessments. Then, the specific-task rubric described as instructors can use not only for one particular task but for different types of tasks. General rubrics reflect general rather than task-specific features for the descriptions and criteria of a learning outcome. General rubrics highlight the basic knowledge and skills that students need to acquire to accomplish certain learning outcomes. Hence, general rubrics help students acquire knowledge and skills that will be useful in solving many similar tasks. However, task-specific rubrics are designed for a specific task or assignment" says, author.

Table 6
The Indicators of Developing Rubrics Assessment

a. The instructor graded all the papers but later he or she had doubts that some of the papers may have been graded differently compared to some other papers in the stack.	b. The instructor has a large number of papers that needs to be corrected within a short time period. The instructor is worried, as he or she is taking more time to correct each paper than he or she expected and thus may fail to meet the deadline for grade submission.	c. The instructor is writing the same comment on every assignment that he or she is checking, despite the fact that the quality of each assignment varies significantly.	d. The instructor is disappointed with class performance because most of the students failed to complete the assignment given to them and scored very low marks.	e. Students often complain to the instructor that they do not understand the marking criteria or the comments that they receive on their assignments as a feedback on their performance.

Southern Cross University (2020) suggests "in developing and used rubric assessment -to overcome the difficulties associated with overly detailed rubrics and to help in the construction of grading standards, researchers have proposed frameworks to assist in the design of effective rubrics. These frameworks help us to see the range of potential student responses to a task – from very basic responses to highly sophisticated ones. This scholar, also, emphases of the acknowledgment toward bloom taxonomy, also Biggs' and Tang's SOLO Taxonomy framework". Moreover, scholar was provided the general description of the detail of analytic and holistic rubric that can be seen on the figure 3 to 10.

Grade	Description of Grade
High Distinction	The project is realised to a very high professional standard. Technically it is fully functional and meets all specifications. It demonstrates high levels of creativity and innovation both in terms of its function and usability. It has a high level of aesthetic appeal. It has been carefully quality controlled to ensure full functionality and that no errors are evident. This product has real 'wow' factor.
Distinction	The project is realised to a high professional standard, with a good level of function and meets most specifications. It demonstrates occasional levels of creativity and innovation and is attractive and aesthetically engaging. While there may be a few errors, these are of a minor nature. Generally the product would be well-regarded by industry standards.
Credit	The project is realised to an acceptable professional standard with generally adequate levels of function and generally meets specifications, although there are a number of problems evident. There is some evidence of creativity and innovation although these are not sustained or notable. Further experimentation and testing could have improved this product considerably. Generally it would not be well regarded by industry and would need more work before release, but still shows good developing competence.
Pass	The project was completed, but to a less than acceptable industry standard. Functionality was problematic and often did not meet required specifications. There is little evidence of creativity or innovation in the project. Numerous errors crept into the work. Significant further work would be required to bring this up to industry standards, but overall it demonstrates sufficient competence to merit a passing grade.
Fail	The project is incomplete and/or work well below industry standards. Functionality is poor or absent. Failure to meet project specifications. Numerous errors. Little or no innovation or aesthetic appeal. A large volume of work required to bring the project up to industry standards. Insufficient effort or competence demonstrated to achieve a passing grade.

Figure 3
Holistic Rubric Sample for multi-media project

Grade	Description of Grade
High Distinction	This essay commands attention because of its insightful development and mature style. The response to the text is convincing and elaborated upon with well-chosen and correctly referenced examples. It is written with aptly chosen words, effectively constructed sentences and a keen observation of the conventions of written English.
Distinction	This essay provides a thoughtful and well reasoned response to the text with appropriate and correctly referenced examples. The sentences are constructed and words chosen to communicate clearly to the reader. The conventions of written English have been well observed.
Credit	This essay provides a competently reasoned response to the text with some appropriate and mostly correctly referenced examples. The sentence structure and choice of words have sufficient precision to communicate the message to the reader. The conventions of written English have been observed.
Pass	This essay is satisfactory. It provides an adequate response to the text with sufficient examples and adequate reasoning. The examples are mostly adequately referenced. The sentence structure and choice of words communicates adequately to the reader. The conventions of written English need to be observed more closely.
Fail	This essay fails to respond appropriately to the text. The responses are simplistic or incoherent and suggest some significant misunderstanding of the text. The writing lacks appropriate structure and has a pattern of errors in word choice with poor grammatical expression. Correctly referenced examples are absent or poorly presented. More attention needs to be paid to the conventions of written English.

Figure 4
Holistic Rubric Sample for an Essay

Grade	Descriptor of Grade
High Distinction	In addition to qualities of a distinction grade, contributions at this level demonstrate a sophisticated synthesis of theoretical understanding and reflection on practice, as well as a high level collegiality in engaging with others.
Distinction	• Contribution to the discussion is relevant, succinct and timely. • Contributions demonstrate deep engagement with issues and recognition and evaluation of differing perspectives. • Contributions are informed by significant reading and critical reflection on own professional practice. • Contributions advance and extend the debate and demonstrate high level of online communication skills.
Credit	• Contribution to the discussion is relevant, succinct and timely. • Contributions demonstrate a good understanding of basic issues and own professional practice. • Contributions are informed by reading and reflection and not only personal opinion. • Clear efforts are evident to engage with others' views and to advance the debate in constructive ways.
Pass	• Some contribution to discussion is evident but may also be untimely. • Contributions make some points that demonstrate basic understanding but do not generally advance the debate. • Contributions suggest only minimal engagement with literature and tend to reflect only personal opinion.
Fail	Fails to make necessary contributions and/or contributions are very late. Comments are generally not scholarly and do not contribute to the debate.

Figure 5
Holistic Rubric Sample for Online Participation

Criteria	High Distinction	Distinction	Credit	Pass	Fail
Critical thinking and argument **45%**	A clear, concise argument, that effectively addresses alternative viewpoints. Applies perspicacious and perceptive critical thinking skills to build the argument. Succinctly and discerningly defines and applies concepts relevant to the argument.	Well-supported argument. Applies well-developed critical thinking skills to build a cohesive argument. Thoughtfully defines and applies concepts relevant to the argument.	Legitimate and factually correct argument. Applies developed critical thinking skills to build a coherent argument. Clearly defines and applies all concepts relevant to the argument.	Argument stated is not based on all relevant facts, or has not been stated clearly. Basic critical thinking skills illustrate limited insight. Defines and applies concepts relevant to the argument.	No argument stated, or argument relies on logical fallacies. Demonstrates a lack of critical thinking skills. Does not apply concepts relevant to the argument.
Research and evidence **40%**	Clear immersion with the question or topic. Outstanding selection and use of relevant evidence. A wide range of key sources adroitly integrated into essay.	Prolific engagement with the question or topic. Comprehensive selection and use of relevant evidence. A range of key sources skilfully integrated into essay.	Productive engagement with the question or topic. Competent selection and use of relevant evidence. A range of appropriate sources integrated into essay.	Engages with the question or topic. Adequate selection and use of relevant evidence. Several relevant sources integrated into essay.	Basic or poor engagement with the question or topic. Little selection or use of relevant evidence. Few or no sources provided.
Presentation structure **15%**	Clear, concise and logically structured essay with a succinct, clear introduction and cogent conclusion. Demonstrates professional use of writing mechanics to engage the intended audience.	Well-structured essay with clear introduction, logical paragraph structure and persuasive conclusion. Well-developed writing mechanics highly appropriate to audience.	Essay includes a clear introduction and reasonable conclusion. Paragraphs in a logical sequence. Successful use of writing mechanics, suited to a general audience.	Essay includes an introduction and conclusion, however lacks clarity. Paragraph sequence could be more logical. Adequate use of writing mechanics.	Essay lacks structure with an unclear introduction and weak conclusion. Major issues with writing mechanics.

Figure 6
Analytic Rubric Sample for an Argumentative Essay

Criteria	High Distinction	Distinction	Credit	Pass	Fail
Definition of the explicitness in problem description 5%	Aim outlines the purpose of the investigation specifically, explicitly, and relevantly.	Aim outlines the purpose of the investigation with minor lapse in explicitness, specificity or relevance.	Aim outlines the purpose of the investigation with some lapse in explicitness, specificity or relevance.	Aim outlines the purpose of the investigation with substantial lapse in explicitness, specificity or relevance.	Aim not given or does not satisfactorily outline the purpose of the investigation.
Clarity and correctness of method 35%	Innovative and correct method of solution to problem.	Above average and substantially correct method of solution to the problem.	Average and mostly correct and complete method of solution to the problem.	Sound but partially incomplete or incorrect method of solution to problem.	Solution to problem not described, or not correct.
Correctness of mathematics 40%	All calculations/ algebra/graphs complete and correct.	Only minor errors or omissions in calculations/ algebra/ graphs.	Calculations/ algebra/graphs partially correct or complete.	Calculations/ algebra/graphs half correct or complete.	Calculations/ algebra/graphs incorrect or not present.
Logical and connected conclusion 10%	Conclusion is explicit, logically and mathematically correct and consistent with the aim, method and results.	Conclusion has minor lapse in explicitness, logical and mathematical correctness or consistency with the aim, method and results.	Conclusion has some lapse in explicitness, logical and mathematical correctness or consistency with the aim, method and results.	Conclusion has substantial lapse in explicitness, logical and mathematical correctness or consistency with the aim, method and results.	Conclusion is not present or not explicit, not logically and mathematically correct, or not consistent with the aim, method and results.
Written mathematical communication 10%	Written expression of high level of achievement using sophisticated mathematical language.	Written expression of high level of achievement with some use of appropriate mathematical language.	Written expression of average level with some use of appropriate mathematical language.	Written expression sound with little use of appropriate mathematical language.	Written expression not included or very poor.

Figure 7
Analytic Rubric Sample for Mathematical Problem Solving & Reporting

	Holistic	Analytic
Advantages	• Useful for tasks that contain inter-related skills and knowledge • Useful for tasks that are holistic in nature e.g. works of art, creative writing, engineering design, essays, projects • Can focus on higher order, inter-related knowledge and skills • May be more authentic in nature • Can be quicker to develop	• Useful when task is composed of discrete skills or knowledge • Provides direct advice on set criteria • Shows students specific strengths and weaknesses • Easier to moderate marking in large classes with large number of markers • Can take more time to develop
Disadvantages	• Can be more difficult to moderate in large classes with large number of markers • May not provide the detailed feedback students expect • Can produce a biased result if markers are not clear on what is required	• Can over-partition a task so that the result is biased towards small skills rather than the overall achievement • Can produce a biased results if criteria are not carefully selected • Can focus on detailed, lower level skills rather than deeper understanding and knowledge

Figure 8
Differentiate of Analytic and Holistic Rubric Used

Assessment stages	Using rubrics to moderate
Design	Rubrics should be moderated after they are designed but before they are released to students. In this phase, the designer and moderator (the academic colleague/s designated to review the unit assessment) will: • ensure the rubric fits with unit learning outcomes, focuses on higher-order learning, uses appropriate marking criteria and standards • ensure that the rubric fits with other rubrics to determine the appropriateness in relation to progressive learning during the course.
Marking	In this phase, the onus is on the Unit Assessor to ensure that all markers have a shared understanding of the rubric criteria and standards before marking commences. The Unit Assessor will implement a moderation process which in this phase includes (Clause 37 Assessment Procedures): • provision to markers of sample responses for short-answer questions • discussion within the marking team about a sample of submitted papers prior to the commencement of marking • sampling by Unit Assessor of marked scripts across each band (i.e. HD, D, etc.) to ensure consistency with adjustment as necessary. Additional moderation processes can include the following (Clause 38 Assessment Procedures): • sampling by Unit Assessor of marked scripts that are on the border between grades with adjustment as necessary • members of marking team are paired – each member marking a sample of the other's papers • double blind marking of all submitted papers followed by a discussion where both markers reach agreement on grade to be awarded (appropriate for honours or higher degree marking).
Awarding of grades	In this phase, the Unit Assessor: • confirms that the grades are correct, fair and consistent before submission to Committee of Examiners (Clause 43 Assessment Procedures) • reports all results through Gradebook in the Learning Management System (Clause 46 Assessment Procedures).

Figure 9
The modern Rubric Assessment Sample

Rubric part	Questions to consider	Yes	No
The marking criteria	Does each criterion cover important parts of the final student performance? Do the criteria capture some key themes in your teaching? Are the criteria clear? Are the criteria distinctly different from each other?		
Descriptions of levels of performance (standards)	Do the descriptions match the criteria? Are the descriptions clear and different from each other? If you used points, is there a clear basis for assigning points for each criteria? If using a three-to-five level rubric, are the descriptions appropriately and equally weighted across the three-to-five levels?		
The levels	Do the descriptors under each level truly represent that level of performance? If not using traditional grade labels (HD, D, C, P), are the scale labels encouraging and still quite informative? Does the rubric have a reasonable number of levels for the stage of the student and the complexity of the assignment?		
The overall rubric	Does the rubric clearly connect to the learning outcomes that it is designed to measure? Can the rubric be understood by external audiences (avoids jargon and technical language)? Does the rubric reflect teachable skills? Does the rubric reward or penalise students based on skills unrelated to the outcome being measured?		
Fairness and sensibility	Is the rubric fair to all students and free of bias? Will the rubric be useful for students as performance feedback? Does the rubric make sense to the reader?		

Figure 10
Rubric Design Checklist

Jaiswal (2019) explains about Biggs' and Tang's SOLO Taxonomy, and said that "in the teacher-centred lecture approach, the focus is on the teacher transferring knowledge while students learn passively through rote learning and memorization. Autonomous learning, also called student-centred learning is based on the constructivist theory of learning. Should be noticed that a gradual move from teacher-centred teaching-to a learner-centred class; is needed in order to foster learner autonomy in the classroom. Some eminent exponents of the constructivist approach include Jerome Bruner, Jean Piaget, Lev Vygotsky, and John Dewey. Bloom's taxonomy is effective in encouraging higher-order thinking in learners by developing from lower-level cognitive skills. This hierarchical taxonomy provides a useful framework in which to categorize test questions. Another efficient model of learning is SOLO taxonomy".

The prominence given to each learner in the classroom, to the significance of constructing meaning, and to the active participation of learners in the teaching learning process are evidently the very elements that make this Constructivist model agreeable to educators. The formulation of the concept of constructivism is credited to Jean Piaget, who drew attention to the mechanisms by which knowledge is internalized by students. '...all knowledge is tied to action, and knowing an object or an event is to use it by assimilating it to an action scheme'. Recently, as awareness is increasing, that transmission of knowledge does not result in learning, there is a paradigm shift from the teacher to the learners in the current educational environment. The model categorizes learning outcomes into five stages, which are organized hierarchically, from no knowledge , progressing to surface learning (uni-structural and multi-structural) to developing deep learning (relational and extended abstract). A basic understanding of the structure of SOLO taxonomy assists educators to review students' productions differently do students have the basic knowledge and facts required(indicating accomplishment at surface learning) or are they able to grasp the interconnectedness of the facts/issues before perceiving key concepts thereby. So, educators can understand the learning process, by reviewing tasks composed by learners in relation to this model. At these levels, understanding is disconnected and at surface level so assessment tasks are primarily quantitative in nature. In the highest or extended abstract level, understanding is at a deeper level and the previously integrated understanding, may possibly be conceptualized at a higher level of abstraction and generalized to a new topic or area. As at this level, understanding is at a deeper level, so assessment tasks continue to be qualitative in nature". In order to acknowledge this framework comprehensively, the following figures below helped the understanding of SOLO and the correlation of rubric assessment implementation, says author.

5 SOLO LEVELS WITH DESCRIPTORS:		Learner Attributes at Each Level In Writing Skills Lesson
SOLO 1 **Prestructural level**	Measurable Verbs	This is the first stage .The learner does not have any knowledge .He does not understand the content, being taught, so is unable to demonstrate understanding. He has missed the point. His responses indicate no recognition of appropriate concept or relevant processing of information. He is yet to grasp the idea and/or needs assistance to grasp the concept. **Delivery of Writing Task** *The task is dealt inappropriately. The work produced has: a poor structure, inconsequential details, poor examples with some misapprehension of the assigned topic, and therefore displays minimal logical relationship with the topic. The response of a prototypal learner at pre-structural stage would likely be 'I don't understand anything'.*
		Surface knowledge (loose ideas) **Quantitative phase**
SOLO 2 **Unistructural level**	VERBS Name Identify Define State Tell Recall Recognize Match Find	At the second stage, categorized as unistructural, the learner has limited knowledge. He can understand, one isolated aspect of the content, being taught. His understanding is disconnected. The learner is progressing at a basic, preliminary level and has not tackled the task appropriately. **Delivery of Writing Task:** *The work produced has a poor structure. However, the learner can identify and grasp one single relevant idea related to the topic. The work focuses largely on this single aspect. This idea is restated in different ways. The response of a prototypal learner at unistructural stage would likely be, 'I have some understanding of this topic.'*
SOLO 3 **Multistructural level**	VERBS Describe List Combine Classify Select Outline	At the next hierarchical stage, classified as Multistructural, the learner knows a few facts, about the content, being taught. He can understand two or more aspects of a task, but fails to grasp their relationships to each other or the whole. At this level, the learner is simply annexing segments of unconnected information. The performance shows no organization; therefore, does not make sense to the learner. **Delivery of Writing Task:** *The work produced has a poor structure Although the learner selects a range of material and most selected content is appropriate, but these ideas are disconnected. The work focuses on a large number of facts with very little attempt at linking ideas. The response of a prototypal learner at Multistructural stage would likely be 'I know a few things about this topic'*
		Deep knowledge (connected ideas) **Qualitative phase**
SOLO 4 **Relational level**	VERBS Compare	As learners make headway towards the relational level, the divergent aspects are linked and integrated, and contribute to a deeper and more coherent understanding of the composite whole. The whole task has a

Figure 11

Categorization of students' learning outcomes according to five SOLO levels of understanding

	Contrast	logical and consistent identifiable structure and meaning. At relational level, students begin to use higher level thinking skills – students are able to link and explain several ideas around a related topic. So a stereotypical student's 'relational response might be: 'I can see the connections between the information I have gathered'.
	Explain	
	Analyze	
	Relate	
	Integrate	*Delivery of Writing Task:*
	Apply	*The work produced is well-structured with a clear introduction and conclusion. The learner selects appropriate material. The content has a logical flow, and ideas are expressed vividly. The response of a prototypal learner at relational stage would likely be 'I can see the connections between the information I have gathered'.*
	Sequence	
	Summarize	
	Categorize	
	Distinguish	
	Extended abstract (conceptual or constructed) knowledge	
	Qualitative phase	
SOLO 5	**VERBS**	Eventually, at the extended abstract level, which is the highest level, the new perception of concepts at the relational level, are amended, at yet another conceptual level. It is perceived in a novel manner, and utilized as the premise for prediction, generalization, reflection, or creation of new understanding (Hook and Mills 2011). The extended abstract, is the final and most complex level. At this stage, not only are students able to link lots of related ideas together, but they can also link these to other bigger ideas and concepts. So a quintessential student's response, at this level, might sound like: 'By reflecting and evaluating on my learning, I am able to look at the bigger picture and link lots of different ideas together'.
Extended abstract level	Predict	
	Reflect	
	Hypothesize	
	Create	
	Justify	
	Imagine	
	Design	*Delivery of Writing Task:*
	Synthesize	*The work produced is well-structured with a clear introduction and conclusion. There is clear evidence of sophisticated analysis or innovative thinking. The response of a prototypal learner at the extended abstract stage would likely be 'By reflecting and evaluating my learning, I am able to look at the bigger picture and link lots of different ideas together'.*
	Evaluate	

Figure 12
Continued

SOLO TASK - What causes obesity in children?	
SOLO Level of Understanding:	Learner response
SOLO 1 Prestructural level	Learner beats about the bush, repeats the question stem or is unable to tackle the question directly. *Many children are obese these days. Obesity is a problem nowadays. Children rush to the cafeteria during lunch breaks.*
SOLO 2 Unistructural level	Only one relevant aspect of the answer is tackled, answer is very opinionated and entails a limited conclusion. *Children are obese because they like fast food too much.*
SOLO 3 Multistructural level	Some aspects of task are addressed but there is no relationship of facts or concepts. The quality of work does not provide a clear logical structure. *There are fast food restaurants on almost every street and nowadays both parents are working and social media is addictive. The problem of obesity is increasing.*
SOLO 4	At relational level, student's performance exhibits higher level thinking. Many

Figure 13
A sample of SOLO Task

| Relational level | aspects are interspersed, so that the task has a coherent structure and meaning – student is able to link and explain several ideas around a related topic.

So a typical student's 'relational response might be: *'I can see the connections between the ideas I have gathered'. Poor diet can cause obesity. Children gain weight due to lack of physical activities. Also,eating too much of fast food can lead to obesity Sometimes,working parents don't get time to cook, so they give fast, convenience store snacks, or high calorie food to children which consequently makes them fat. Besides, many children are addicted to video games and social media, so they don't burn their calories.* |
|---|---|
| **SOLO 5**
Extended abstract level | The final and most complex level is the extended abstract level. At this level, not only is quintessential student, able to link lots of related ideas together, but he/she can also link them to other bigger ideas and concepts.

So a typical student's response at this level might be: *'By reflecting and evaluating on my learning, I am able to look at the bigger picture and link lots of different ideas together'. At this stage, the coherent answer is generalized to a higher level of abstraction. It has a good framework and is well structured. The answer exhibits extensive reading, innovative thinking and sophisticated analysis of the issue. It delineates all the causes of obesity among children and indicates that a research should be carried out in future to identify viable solutions to the problem. It compares the current problem of obesity with the situation ten years ago. It elaborates other related problems, children are facing and elucidates that the solution lies in creating awareness about the effects of behavioral disorders, of the dire need for consuming proper nutrition and of maintaining a healthy lifestyle.* |

Figure 14
Continued

Mertler (2001) says significantly "to holistic rubrics are customarily utilized when errors in some part of the process can be tolerated provided the overall quality is high; further, that use of holistic rubrics is probably more appropriate when performance tasks require students to create some sort of response and where there is no definitive correct answer. The focus of a score reported using a holistic rubric is on the overall quality, proficiency, or understanding of the specific content and skills-it involves assessment on a unidimensional level. Use of holistic rubrics can result in a somewhat quicker scoring process than use of analytic rubrics. This is basically due to the fact that the teacher is required to read through or otherwise examine the student product or performance only once, in order to get an "overall" sense of what the student was able to accomplish. Since assessment of the overall performance is the key, holistic rubrics are also typically, though not exclusively, used when the purpose of the performance assessment is summative in nature. At most, only limited feedback is provided to the student as a result of scoring performance tasks in this manner".

Table 7
The Sample of Holistic Rubric

| Score Description	Template for Holistic Rubrics
5	Demonstrates complete understanding of the problem. All requirements of task are included in response.
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted.
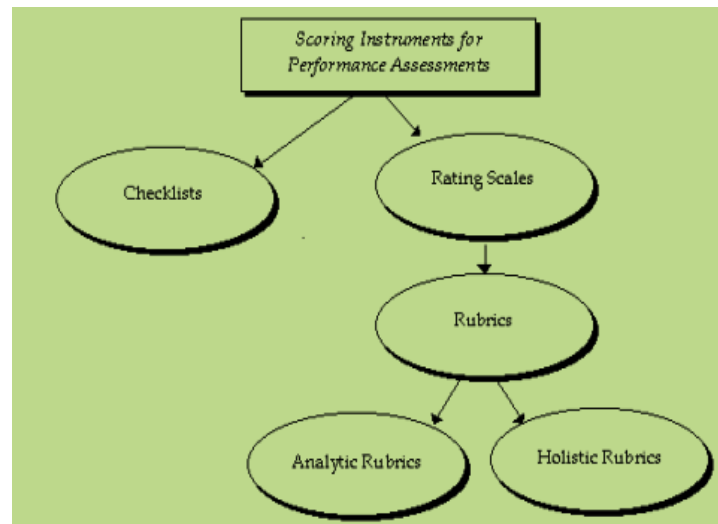
Figure 15

Types of Scoring Instruments for Performance Assessments

In depth a step-by-step process for designing scoring rubrics for classroom use is presented below. Information for these procedures was compiled from various sources. The steps will be summarized and discussed, followed by presentations of two sample scoring rubrics, says author.

Step 1:	*Re-examine the learning objectives to be addressed by the task.* This allows you to match your scoring guide with your objectives and actual instruction.
Step 2:	*Identify specific observable attributes that you want to see (as well as those you don't want to see) your students demonstrate in their product, process, or performance.* Specify the characteristics, skills, or behaviors that you will be looking for, as well as common mistakes you do not want to see.
Step 3:	*Brainstorm characteristics that describe each attribute.* Identify ways to describe above average, average, and below average performance for each observable attribute identified in Step 2.
Step 4a:	*For holistic rubrics, write thorough narrative descriptions for excellent work and poor work incorporating each attribute into the description.* Describe the highest and lowest levels of performance combining the descriptors for all attributes.
Step 4b:	*For analytic rubrics, write thorough narrative descriptions for excellent work and poor work for each individual attribute.* Describe the highest and lowest levels of performance using the descriptors for each attribute separately.
Step 5a:	*For holistic rubrics, complete the rubric by describing other levels on the continuum that ranges from excellent to poor work for the collective attributes.* Write descriptions for all intermediate levels of performance.
Step 5b:	*For analytic rubrics, complete the rubric by describing other levels on the continuum that ranges from excellent to poor work for each attribute.* Write descriptions for all intermediate levels of performance for each attribute separately.
Step 6:	*Collect samples of student work that exemplify each level.* These will help you score in the future by serving as benchmarks.
Step 7:	*Revise the rubric, as necessary.* Be prepared to reflect on the effectiveness of the rubric and revise it prior to its next implementation.

Figure 16

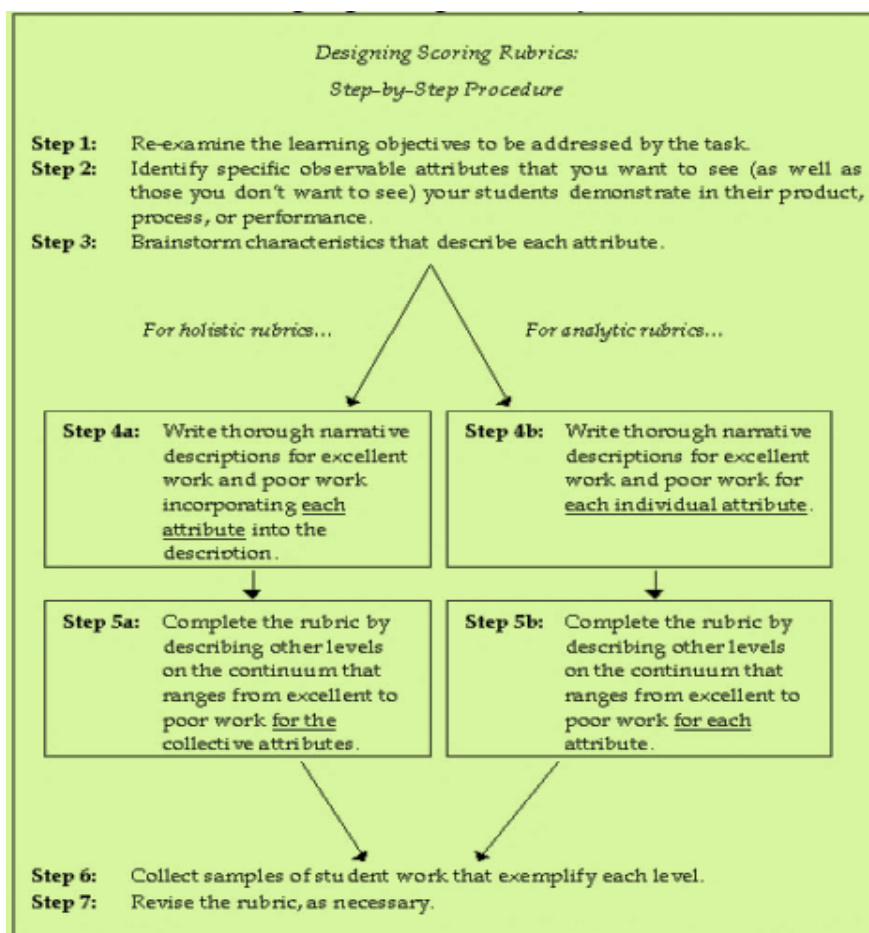A Step-by-Step Process for Designing Scoring Rubrics for Classroom

Figure 17

Designing Scoring Rubrics for Your Classroom

Simon & Forgette-Giroux (2019) analyses "the stability of assessment results, however, rests on the scale's ability to lead to a common and uniform interpretation of student performance. The assessment of postsecondary academic skills on the basis of such a scale offers several advantages. First, it presents a continuum of performance levels, defined in terms of selected criteria, towards to full attainment or development of the targeted skills. Second, it provides qualitative information regarding the observed performance in relation to a desired one. Third, its application, at regular intervals, tracks the student's progress of his or her skill mastery. Finally, the choice of rather broad universal criteria extends the application to several contexts. Nature of the rubric; rubric for scoring academic skills is essentially qualitative and descriptive in nature and relies on criterion referenced perspectives. The criteria form the left-hand column of the two-way table format and the horizontal continuum contains headings indicating four increasing levels of performance towards competency mastery. The use of the scale involves the acts of scoring, interpreting, and judging. Scoring occurs when one identifies, within the scale, and for each criterion, the cell description that most closely matches the observed performance. The interpretation consists of locating the column that best describes the level of skill mastery; judging means comparing the identified or observed performance level to a predetermined standard level".

As explained by (Hung et al., 2012) "educational resources do not replace investments in teacher training and the necessary improvements in public education systems, but they can provide subsidies for educators in approaching diverse topics". "Although the rubric has emerged as one of the most popular assessment tools in progressive educational programs, there is an unfortunate dearth of information in the literature quantifying the actual effectiveness of the rubric as an assessment tool in the hands of the students. A generalizability study yields estimates of inter-

rater reliability of moderate values across all years and allows for the estimation of variance components. Taken together, these data indicate that the general form and evaluative criteria of the rubric are clear and that the rubric is a useful assessment tool for peer-group (and self-) assessment by students. To our knowledge, these data provide the first statistical documentation of the validity and reliability of the rubric for student peer-group assessment" (Hafner & Hafner, 2003). In the other research cases, showed that "the experimental project investigated the reliability and validity of rubrics in the assessment of students' written responses to a social science 'writing prompt'. The participants were asked to grade one of the two samples of writing assuming it was written by a graduate student. In fact, both samples were prepared by the authors. The first sample was well written in terms of sentence structure, spelling, grammar, and punctuation; however, the author did not fully answer the question. The second sample fully answered each part of the question but included multiple errors in structure, spelling, grammar and punctuation. In the first experiment, the first sample was assessed by participants once without a rubric and once with a rubric. In the second experiment, the second sample was assessed by participants once without a rubric and once with a rubric. The results showed that rates were significantly influenced by the mechanical characteristics of students' writing rather than the content even when they used a rubric. Study results also indicated that using rubrics may not improve the reliability or validity of assessment if ratters are not well trained on how to design and employ them effectively" (Rezaei & Lovorn, 2010).

Curran et al. (2011) argues in "inter-professional learning, competency-based education has become more widely accepted as a means of defining the outcomes expected of learners and driving the inter-professional education process. 'Competency' has been defined as a dynamic concept that encompasses an understanding of the knowledge, clinical skills, interpersonal and problem-solving skills required for excellence in professional performance. It is related to the ability of the learner to apply the knowledge and comprehension appropriately in relevant situations and within the context of inter-professional working, competency may be viewed as the ability of a health professional to work together with others to solve problems and deliver services. A competency is, however, more than just a set of specific, knowledge, skills and attitudes; it involves the coordination of a person's cognitive, affective and other resources and willingness to use these in the performance of a professional task. Rubrics are generally composed of dimensions for judging learner performance, a scale for rating performances on each dimension, and standards of excellence for specified performance levels. Rubrics are beneficial to examiners, instructors and learners in a number of ways".

5. Revitalization STEAM Framework

Katz-Buonincontro (2018) believes "despite the rise of STEAM (science, technology, engineering, arts and mathematics) as an educational framework, there is a notable gap in the documentation of STEAM teaching practice and research". Same with (Erwin, 2017) scholar said, for those of you who have been teaching for a while, the concept of STEM (or STEAM) is not "new." Science, technology, engineering, arts and mathematics (STEAM) educational programs are geared to revitalize the disciplines due to a skills gap and shortage of skilled employees in these areas. But, the notion of STEAM began with the launch of the Sputnik, a Russian satellite, into space in 1957. In an effort to lead in science, technology, engineering and math, Americans stepped up to the challenge. The major push for literal STEM schools started in 2005 when the acronym was first explicitly mentioned in a caucus in Congress. That same year, a report from the U.S. National Academies of Science, Engineering and Medicine indicated that U.S. students were lacking proficiency in STEM compared to students from other countries. Currently, only 16 per cent of American high school seniors are proficient in math and interested in a STEM career. Problem-based learning, or PBL, is a strategy often used in STEAM schools, focusing on teaching with a student-center approach through guided discovery. Students work in groups to solve questions or general issues that are applicable in everyday life. Some of the key

concepts involved in PBL are: problems are challenging and open-ended; problems are context specific; students work in small, self-directed groups; students identify a key problem and work toward a solution; teachers act as facilitators".

Khoiron et al. (2020) explains "nowadays, education in schools is being criticized more concerned with cognitive aspects than effective aspects. In practice, there are still many teachers who do not consider the affective aspects because the domain is highlighted in learning only. Especially for social studies subject, there are still many teachers who teach by giving memorizing material, instead of understanding material. As a result, learning material obtained from schools is not used by pupils in interacting with their environment. This happens because the pupils only learn about something that has been stated as truth solely according to social science. In short, this research focused on social science field, therefore scholar found that some aspect must be concerned to develop in social field: 1), science, 2) technology, 3) art, and 4) culture [17]. Whereas in the dimensions of skills, they include: having thinking and acting skills: 1) creative, 2) productive, 3) critical, 4) independent, 5) collaborative and 6) communicative. Then on the dimensions of attitude; Having behaviour that reflects attitudes; 1) faithful and fearful of God Almighty, 2) character, honest and caring, 3) responsible, 4) true learners throughout life, and 5) physically and mentally healthy in accordance with the development of children in the family, school, community, and environment natural environment, nation, country and regional region".

Next "approach occurred in analysing learner and context: Education in schools, including social studies, must indeed be able to keep up with the development of the pupils' world wherever they are. If there is a development in the world of technology, for example, we must also be able to follow and adapt to technological developments. Therefore, in social studies learning it is very important to pay attention to the current situation of pupils, both in terms of science, technology, art, and culture. In approach of writes performance objectives: the formulation of performance goals must be specific about what abilities pupils will get when finished through the learning process. So, the competency standards for social studies learning at the elementary and secondary education levels are divided into three different dimensions, namely: knowledge, attitudes, and skills. Connected with attitude competence, the dimension of knowledge understands and applying knowledge (factual, conceptual, and procedural) based on curiosity about science, technology, art, and culture related to phenomena and events that appear to the eye. Then in the dimensions of skill, there are processing, presenting, and reasoning in the concrete realm (using, parsing, stringing, modifying, and creating) and abstract realms (writing, reading, counting, drawing, and compose) in accordance with what is learned in schools and other sources are the same in viewpoints/theories. While to the approach of develop assessment instruments: considering the dimensions of social studies include knowledge, skills, and attitudes, the instruments arranged must also be able to accommodate these three dimensions. Alternative assessment instruments that can be used so that all aspects are represented include using 1) Performance-based evaluation, 2) Portfolio, 3) Project-based evaluation, 4) Rubrics, 5) Checklists, 6) Concept maps, 7) Rating scales, 8) Observation forms, 9) Oral presentations, 10) Attitude scales, 11) Self-evaluations, 12) Peer evaluations, 13) Group evaluations, 14) Interviews, 15) Constructed grids, 16) Diagnostic trees, and 17) Word association tests. Social studies teachers can develop assessment instruments from the various alternatives above. For example, it is not limited to the paper-based test but can also use interviews, attitude assessment, self-assessment or presentation of the results. The development of such instruments needs to be carried out according to the situation, context, and characteristics of pupils. If necessary, the teacher may hold a practical exam for social studies, moreover, there has never been a practical

examination for social studies subjects at school. So in this case, what must be developed in the process of assessing social studies is on the part of the assessment of attitudes and skills along with their assessment instruments", says author.

In approach of develop an instructional strategy: "by having the previous five steps, a teacher can develop learning strategies that can support learning achievement, based on the theory of learning and the results of recent research [15]. Learning strategies will affect the learning process in the classroom. Therefore it is important to determine learning strategies based on logical and academic considerations. If seen, based on the applicable curriculum and current conditions, then one of the learning strategies that can be developed in social studies is STEAM learning strategy (Science, Technology, Engineering, Art, and Mathematics). Teachers can adopt STEAM learning and use it to be developed following social studies learning needs. STEAM learning strategy is one of the breakthroughs in the world of Indonesian education to invite pupils to think critically and have techniques or designs to solve problems based on their mathematics and science skills. STEAM's strategy is to answer the challenges of the 21st century that require people who have technological skills, information management, innovation, learning, career, and global awareness and character. Next, the approach of develop and select instructional materials: to synchronize with the current development and conditions of pupils, the selection and development of learning materials can use the theme 'social media in social life', because before choosing teaching materials we must pay attention to; general learning objectives, conditions, and context of pupils, goals of learning performance, strategies, and assessment instruments. Accordingly, the theme of social media will be a contextual part of student learning". Last is the approach of design and conduct a formative education: therefore, the summative evaluation does not only focus on the paper-based test but must also include a practice test. Thus the dimensions of attitudes and skills can be measured more authentically. Evaluation that aims to improve the learning process that occurs. Hence the assessment of social studies learning must pay attention to three aspects that have been mentioned before (i.e. knowledge, attitudes, and skills). As discussed in the section on compiling assessment instruments", says author.

Elmeski (2013) finds "school reform means that principals are changing from agents of authority to leaders with school improvement responsibilities. This shift in mission can be stressful for principals who are called to lead, but are often constrained by bureaucratic and place based challenges. Some of the physical, socio-political, emotional and spiritual realities; within urban school principals operate. One conclusion of this study is that in the face of often overwhelming physical and socio-political realities; principals dig deeper into their emotional and spiritual reserves to improve their schools and their students' lives. Therefore, the dramatic resolution of that chaos were Failing to empower principals to lead reinforces school isolation and misses the opportunity of leveraging principals' rootedness in the community to help end social exclusion; Morocco face". Park & Green (2020) agrees the goal of science education is scientific literacy, which is extended in its meaning in the 21st century. Students must be equipped with the skills necessary to solve problems from the community. Computational thinking (CT) is one of the competencies required in science education. Next Generation Science Standards (NGSS) places a new emphasis on authentic scientific investigation. CT is a basic skill for all humans, not just computer scientists". Opposite to (Lee et al., 2019) scholars found "the NSW project fosters a dual-learning environment in which the stories told by science and native cultures (particularly Ojibwe and D(L)akota) are woven together into a tapestry—an image that ultimately reveals new and deeper meaning than could not be found in any of the threads alone. In this way, Native American students are encouraged to approach, pursue, and contribute to STEM without

compromising their cultural identity. The work of the Native Skywatchers research and programming initiative aims to undermine this crisis. Since 2007 interdisciplinary resources that stand at the nexus of science, culture, and art have been designed and delivered by a team of native scientists, educators, cultural experts, and artists. The intent of this work is to promote the native voice as the lead voice in defining indigenous STEM. And at the same time the inclusion of culture should not diminish the science content, but rather open the door for wider participate and a fuller spectrum of teaching and learning engagement; noted, the NSW approach explores similarities between native ways of knowing the natural world and those of western science, toward the co-creation of a 'dual-learning" system'".

However, (Gess & Kuo, 2019) found "Science, Technology, Engineering, Arts, and Mathematics (STEAM) education is an instructional approach whereby teachers intentionally construct design-based learning opportunities to help students learn and apply content knowledge across disciplines in real-life situations. Results indicate that continuous support in STEAM education is still needed to help preservice teachers move from positive perspectives toward STEAM education to effective practices in the K-12 classroom". In addition, (Bazler & Van Sickle, 2017) added on STEAM education in practice is an essential research publication for the information on curriculum development, instructional design, and educational benefits of STEAM learning initiatives; featuring coverage on a range of topics including fine arts, differentiated instruction, and student engagement". Kartini & Widodo (2020) finds the gap: "this study also found that teachers were ready to implement STEAM in elementary schools. However, some teachers still have problems with their skills and knowledge about STEAM. Therefore this study recommends training for elementary school teachers to implement the STEAM approach. The problems and possibilities presented in this study are expected to contribute as a reference for teachers and policy makers to implement STEAM in primary schools. Teachers' perceptions, interests and competencies to implement STEAM learning, greatly affect students' interests and perceptions about STEAM. Teachers, who have good knowledge and understanding of STEAM, will more likely promote students to have good perceptions about STEAM". While (Hernandez, 2018) constructed the idea of STEAM from the literacy of rubric assessment. Then, this scholar described that STEAM rubrics design developed in structure of Integration criteria, Operation criteria, Academic criteria. Moreover, the following tables below showed the detail of rubric construction.

Table 8
The Sample of Rubric Assessment of STEAM

✓ Integration criteria refer to the level of integration at a given school, ranging from a class, grade, to the entire school. This means that schools with greater integration across grade and department levels receive more points toward their designation than those operating at a single grade level.
✓ Operation criteria involve STE(A)M course offerings, teacher professional development, student STE(A)M competitions, and parent showcases. • Across all school types, the rubric contains requirements for teacher professional development, partnerships, and STE(A)M competitions. ❖ At a minimum, 40% of teachers are required to participate in at least one STE(A)M-focused professional development activity. Schools receive maximum points toward their designation if 60% or more of their teachers engage in STE(A)M-focused professional development; ❖ Moreover, schools are required to maintain at least two businesses, community, or post-secondary partnerships involved with the STE(A)M program; ❖ Schools are also required to participate in several Science Fairs and other STE(A)M

focused events throughout the school year. Additionally, middle and high schools are required to participate in related CTE competitions.

- Naturally, science and mathematics course offerings depend on the school type since students are able to participate in more elective choices as they progress through middle and high school;
    - ❖ Elementary schools are required to have at least two science and two problem solving showcases using STEM lessons;
    - ❖ Middle schools are required to have at least 25% of 8th grade students enrolled in advanced science and mathematics courses, and 5% of 7th grade students enrolled in advanced science courses.;
    - ❖ High schools are required to offer three science and three mathematics courses in the following areas: Advanced Placement (AP), International Baccalaureate (IB), Cambridge Advanced International Certificate of Education (AICE), or Dual Enrolment (DE). Additionally, they must have a minimum of 5% of total students enrolled in one of each of those courses;
    - ❖ Alternately, high schools with less than or equal to 500 students must offer at least two science courses and one mathematics course.
- Middle and High schools are required to also offer Career and Technical Education (CTE).
    - ❖ Schools must offer at least one CTE course within a STEM career cluster;
    - ❖ Additionally, schools must maintain the minimum district average passing rate for the accompanying Industry Certification Exam (ICE).
- For those schools applying for a STEAM designation, there are Visual and Performing Arts (VPA) Education offering requirements as well.
    - ❖ All schools, regardless of type, are required to participate in at least one district performance or exhibition event yearly;
    - ❖ Elementary schools are required to offer at least one hour of continuous instruction per week in art and music;
    - ❖ Middle and high schools are required to offer one of the VPA strands inclusive but not limited to band, orchestra, chorus, art, drama, dance, guitar, in its complete course sequence.

✓ Academic criteria involve STE(A)M equity among students and accountability in science and mathematics.

- All schools are required to increase the percentage of students scoring at Achievement Level 3 or higher on the state science and mathematics assessments by at least three percentage points. Alternatively, schools may exhibit at least 40% of the students scoring at Achievement Level 3 or higher on both Science and Mathematics state assessments.
    - ❖ Additionally, to establish equity among all students, minority and economically disadvantaged students (students eligible for the free and reduced-price lunch) are also expected to perform at the same standards on both state assessments.
- Middle schools are also required to have at least 25% of 8th grade and 5% of 7th grade minority and economically disadvantaged students enrolled in advanced science courses and 25% of 8th grade students in advanced mathematics courses.
- High schools also need to offer at least three AP/IB/AICE/DE in science and two in mathematics, with a minimum of 5% of minority and economically disadvantaged students enrolled in one of these courses.
- High schools are additionally required to show an increase of at least one percentage point on the college career acceleration success component of the school grading system. Alternatively, schools must earn a minimum of 40% points on the college career success component.

Quigley & Herro (2016) emphasis "in response to a desire to strengthen the economy, educational settings are emphasizing science, technology, engineering, and mathematics (STEM) curriculum and programs. Yet, because of the narrow approach to STEM, educational leaders continue to call for a more balanced approach to teaching and learning, which includes the arts, design, and

humanities. This desire created space for science, technology, engineering, arts, and mathematics (STEAM) education, a transdisciplinary approach that focuses on problem-solving. STEAM-based curricula and STEAM-themed schools are appearing all over the globe. This growing national and global attention to STEAM provides an opportunity for teacher education to explore the ways in which teachers implement STEAM practices, examining the successes and challenges, and how teachers are beginning to make sense of this innovative teaching practice". Shahali et al. (2016) admits "integrated STEM education: STEM integration offers students one of the best opportunities to experience learning in a real-world situation, rather than to learn bits and pieces and then to have to assimilate them at a later time. The separate-subject approach offers little more than a disconnected and incoherent assortment of facts and skills. Through STEM integration, it will (1) deepen student understanding of each discipline by contextualizing concepts, (2) broaden student understanding of STEM disciplines through exposure to socially and culturally relevant STEM contexts, and (3) increase interest in STEM disciplines by increasing the pathways for students to enter the STEM fields. Curriculum integration was grounded in the tenets of constructivism; an integrated curriculum as one with explicit assimilation of concepts from more than one discipline. Remember that, there is no unity, no real sense to it all. It is as if in real life, when faced with problems or puzzling situations, we stopped to ask which part is science, which part mathematics, which part art, and so on. Through STEM integration, it will (1) deepen student understanding of each discipline by contextualizing concepts, (2) broaden student understanding of STEM disciplines through exposure to socially and culturally relevant STEM contexts, and (3) increase interest in STEM disciplines by increasing the pathways for students to enter the STEM fields. Therefore, how can deal with adaptation action of STEM to general education, scholars suggested that in a STEM integration classroom students should be able to perform as 1) problem solvers, 2) innovators, 3) inventors, 4) logical thinkers, and also be able to understand and develop the skills needed for 5) self-reliance and 6) technological literacy. An analysis of different STEM programs and curricula designs revealed that many researchers and educators agreed on the two major foci of STEM integration: (1) problem solving through developing solutions and (2) inquiry. In short, teaching STEM integration not only needs to focus on content knowledge but also needs to include problem-solving skills and inquiry-based instruction".

Del Cerro Velázquez & Lozano Rivas (2020) sees STEM sustainable development goals engagement that reflected from various countries where used STEM framework to achieve SDGs purposes. Therefore, these scholars were presented and proposing list of specific learning objectives for the SDGs and key competencies for sustainability; which possible to adopt and adapted by the other countries around the world. So, the lists can be seen on figure 18-19.

Specific Learning Objectives for the SDGs	Key Competencies for Sustainability
The **cognitive domain** comprises knowledge and thinking skills necessary to better understand the SDG and the challenges in achieving it.	**Systems thinking competency**: The abilities to recognize and understand relationships; to analyze complex systems; to think of how systems are embedded within different domains and different scales; and to deal with uncertainty.
	Anticipatory competency: The abilities to understand and evaluate multiple futures—possible, probable, and desirable; to create one's own visions for the future; to apply the precautionary principle; to assess the consequences of actions; and to deal with risks and changes.
	Normative competency: The abilities to understand and reflect on the norms and values that underlie one's actions; and to negotiate sustainability values, principles, goals, and targets, in a context of conflicts of interests and trade-offs, uncertain knowledge, and contradictions.
The **socio-emotional domain** includes social skills that enable learners to collaborate, negotiate, and communicate to promote the SDGs as well as self-reflection skills, values, attitudes, and motivations that enable learners to develop themselves.	**Strategic competency**: The abilities to collectively develop and implement innovative actions that further sustainability at the local level and further afield.
	Collaboration competency: The abilities to learn from others; to understand and respect the needs, perspectives, and actions of others (empathy); to understand, relate to, and be sensitive to others (empathic leadership); to deal with conflicts in a group; and to facilitate collaborative and participatory problem solving.
	Critical thinking competency: The ability to question norms, practices, and opinions; to reflect on own one's values, perceptions, and actions; and to take a position in the sustainability discourse.

Figure 18
The List of Specific Learning Objectives for the SDGs and Key Competencies

The **behavioral domain** describes action competencies.	**Self-awareness competency**: The ability to reflect on one's own role in the local community and (global) society; to continually evaluate and further motivate one's actions; and to deal with one's feelings and desires.
	Integrated problem-solving competency: The overarching ability to apply different problem-solving frameworks to complex sustainability problems and develop viable, inclusive, and equitable solution options that promote sustainable development, integrating the above-mentioned competences.

Figure 19
Continued

Stressfully explanations described that, "the quality of teacher learning practices currently continues to be improved through various training programs, mentoring, and evaluations from Indonesian government support. The 21st-century teacher's ability to develop learning technology is a cooperative learning approach and multidisciplinary integration of science to solve surrounding problems. In the case of vocational education, scholars found that the key to vocational education is declared successful, professional and sustainable, determined on three aspects, namely curriculum, learning, and teachers, in responding to the challenges of the 21st century. Currently, vocational education in Indonesia is undergoing a curriculum transition that was originally in the Competency-based curriculum and the education unit level curriculum developed into the 2013 curriculum even the most recent was the 2013 curriculum revised. The main factors are the quality of teachers, the education system, education funds, and the decentralization of education. The researcher assumes that the problems that arise have an impact on the low national teacher exam scores at the standard limits. Following are the achievements of the Program for International Student Assessment [PISA] index for 2009- 2015. Researchers believe that many other factors have not discussed yet. However, the focus on the existing

problem is the improvement of professional human resources, as a critical factor by describing the strong objectives of the revised 2013 curriculum in entering the global market in 2013. Following is the relationship of change analysis with the revised 2013 curriculum" (NURTANTO et al., 2020).

Year	Competency test	Indonesian average score	International average score	Indonesia's ranking	Country of participation
2009	Read	402	500	57	
	Mathematics	371	500	61	65
	Science	383	500	60	
2012	Read	396	500	62	
	Mathematics	375	500	64	65
	Science	382	500	64	
2015	Read	397	500	61	
	Mathematics	386	500	63	69
	Science	403	500	62	

Figure 20
PISA Index Achievement Results from 2009–2015

Component	Curriculum of 2013	Analysis of changes
Achievement Targets	Students master the core competencies of processing, reasoning and serving in the realm of concrete related to the development of what they learn in school independently and can use methods according to scientific principles	The aspects of reading competence categorized into three types which include: a) The ability to disclose retrieving information, b) Developing an interpretation, c) Reflect and evaluate the text. High-level thinking dominated the entire PISA reading problem from 2000 to 2009
Emphasis on Subject Subjects	Emphasized in science and technology, especially science and mathematics subjects	PISA only consists of math, reading, and science tests. The means that the emphasis on science and technology and mathematics is in line with what PISA experts in the human resources needed in the 21st century for mastering science and mathematics

Figure 21
Analysis of the 2013 Curriculum Change, the Impact of PISA

Component	Curriculum of 2013	Analysis of changes
Subjects tested	Emphasis on three subjects in Mathematics, Indonesian, English	PISA consists of math, reading, and science tests.
Types of Questions on National Examination, evaluation	Questions are curriculum evaluations added with HOTS (high order thinking skills)	HOTS character is the same character in PISA competence. That is exercising higher-order thinking skills, including the ability to develop interpretations, the ability to reflect, and the ability to evaluate texts.
Learning process	Emphasis on practice and seeking learning information independently	One of the goals in PISA is to measure students 'understanding of learning that can answer students' problems in daily life. Emphasis on practice and search for information independently makes students seek knowledge through the surrounding environment so that it is expected to be able to answer problems in the life to come.
The role of the teacher in the classroom	The teacher is a facilitator	Before joining PISA, the teacher figure was a central figure. After joining PISA, the teacher is only a student facilitator in gaining his knowledge.

Figure 22
Continued

Once again, emphasized that "one of the characteristics of STEM is being able to solve problems. Many researchers reveal that EDP improves student achievement, especially in the mastery of science. The characteristics of vocational education in the implementation of the STEM model,

which integrated with the EDP, illustrate the stages of STEM implementation and determine its effect after the experiment", says author.

The topics: Identifying electronic components	
Basic Competencies	Indicators of Competency Achievement
3.12. Understanding the basics of simple electronics	3.12.1. Identifying the types of electronic components
	3.12.2. Explaining the working principle of electronic components
	3.12.3. Interpreting simple electronic circuit wiring diagrams
4.12. Make a simple electronic circuit	4.12.1. Making a simple electric circuit
	4.12.2. Measuring resistance, current, and voltage in a simple electrical circuit

Figure 23
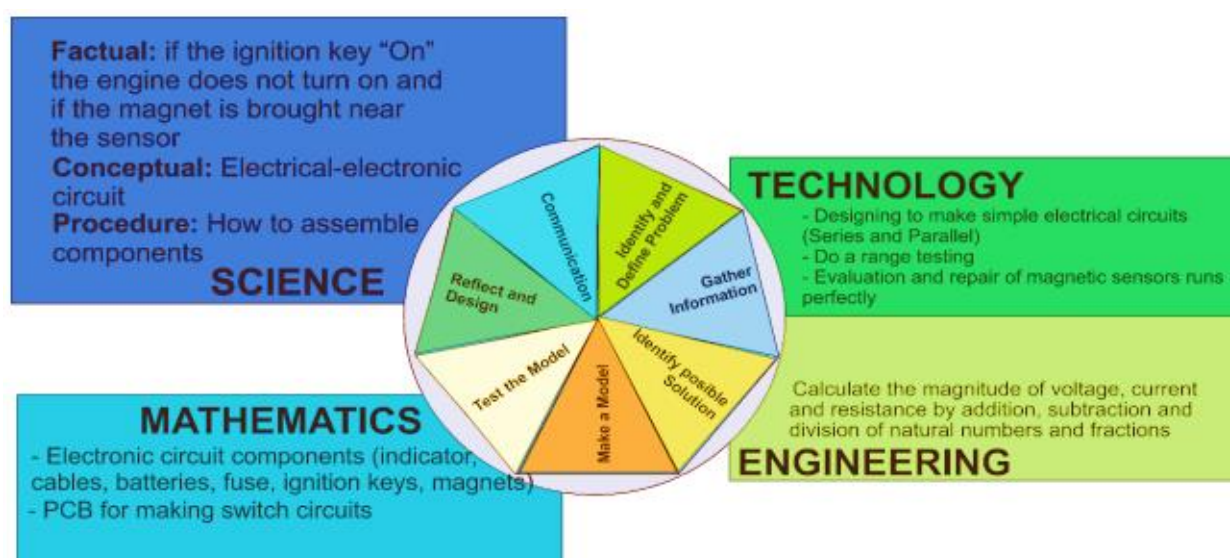Understanding Topics and Basic Competencies

Figure 24
Concept of STEM-EDP Approach "Identifying Electronic Components

6. Factors to Improve Generation Z Learner

Yu (2020) says "despite the success of online learning, the dropout rate of online courses persists. Main reasons for online students to drop out are physical separation, low academic skill level, low technical skill level and lack of motivation. Because of that, to advanced multimedia integrations and an Internet-based interactive interface, online learning can offer enriched instructional features, such as: • 24/7 easy accessibility, • live real-time learning, • self-paced learning designed to be accomplished at a student's speed, • timed learning with designated assignment deadlines, • asynchronous discussion boards, • real-time video and text-based chatting, • multimodality of communication, including email, interactive web Q&A, live contact, etc., • multidirectional interactions with the instructor, other students, the course materials, or other multimedia resources through course activities, • collaboration with peers (i.e., group work, with access to peers' work for critiquing and responding to it), • online quizzes and software for plagiarism detection (e.g., Turnitin), • availability of multimedia materials and applications (e.g., video), and so on. By combining the unique features of both online and face-to-face instruction, blended learning (or hybrid learning) offers the following benefits: broadening access to instruction; facilitating small-group and one-to-one teacher-led instruction; serving students with very diverse needs; providing more opportunity for productive practice; adding variety to instruction and enhancing student engagement; supporting the learning of complex, abstract concepts. In the context of generation Z, and based on neuro-linguistic programming; according to preferred learning modes, learners are identified as aural, visual, read/write, or kinaesthetic as follows: aural: people with a strong aural preference for learning who like discussions, stories, and chatting. Visual: people with a

strong visual preference for learning who like different formats, such as graphs, charts, and maps. Read/write: people with a strong read/write preference for learning who like lists, notes and text. Kinaesthetic: people with a strong kinaesthetic preference for learning who like practical exercises, examples, and trial and error. In addition, motivation is one of a prior factor that concerned in generation Z learning process; motivation is 'the process whereby goal directed activity is instigated and sustained'. According to the levels of 'motive for success and 'fear of failure'- learners are categorized into four types as follows: Over-strives: they are highly motivated to avoid failure and approach success. Learner work very hard in achieving tasks but also feel very anxious and stressed because of their fear of failure; Success-oriented students: are highly motivated to succeed and have a low fear of failure. Learner is highly engaged in achieving activities and not anxious or worried about their performance. Failure avoiders: Learners fear failure and has a low motive for success-are very anxious and seek to avoid failure. Failure accepters: Learner is low in their motivation to avoid failure and succeed-are indifferent to achievement".

Linked to generation Z narration, according to (Pikhart & Klímová, 2020) "the categorization of Generation X, Y, and Z has been largely acknowledged but has also attracted criticism in various social sciences and humanities research. Scholars claim that the theory aptly presents findings that are easily applicable to the educational process. Generation X, born between 1965 and 1980, could be described as more autonomous during the learning process and they appreciate quick and simple instructions and also quick gains. Generation Y, born 1981 to 1999, also called Millennials, are characterized by the generation focus on activities in groups and a cooperative environment is very motivating for them. This generation who appreciate coaching, being led, and give regular feedback. For this study, it is important that they are the first generation that uses modern technologies in their learning process in a massive way. This is the first generation that is connected online, and eLearning platforms are very much appreciated by those generation. While, the current generation of the students and young adults who start to attend universities are the so-called Fifth Generation, or Generation Z. This generation of learners are born after the year 2000 and it is claimed to be very different from the previous generation regarding learning styles and the use of technologies in the learning process. This is the Google generation, i.e., the generation of the students who use the Internet as the only authoritative source of information, and the Internet provides them a platform that aggregates both information and entertainment. Education is therefore a synergy of information and entertainment for the society". Hernandez-de-Menendez et al. (2020) agree "students of Generation Z are authentic digital natives who are a hyper cognitive generation with different student profiles. They are creating pressures for change, and there is a growing competition of universities for human talent. One of the most important actions to achieve this is an investment in technological resources to offer new ways of teaching and learning".

Mohr & Mohr (2017) highlights "Digital Natives comprise the dominant generation of students currently entering college. GenZers described themselves as loyal, thoughtful, compassionate, open-minded, and responsible—a rather affable self-description; For example, while wanting to show compassion, they admit to being critical of their peers; additionally report about being excited, yet fearful, about the future. Gen Z students show less preference for working with others, while suffering from Fear of Missing Out (FOMO) anxiety. Gen-Z students may need guidance and options when asked to work with others. They also admit to feeling overwhelmed by the availability of information. College instructors may need to narrow sources of information that students are to use to complete coursework. Scholars proposed number of approach to bridge the generation Z in learning process; first, Adjusting Our Assignments and Communication Techniques for Gen Z: Faculty should consider possible revisions of key course assignments for Gen-Z students. Students prefer flipped courses and rely on YouTube as a primary source of self-instruction. Digital Natives may need guidance in how to sift, sort, and synthesize information. Many youths have succumbed to binge-watching of favourite shows and instructors may not understand how current students can get caught up in, or lost on, the Internet. Second, Assignments: Promoting Appeals and Countering Pitfalls: University faculty often use

discussions and reflections on reading assignments, quizzes or tests on course content. Some faculty also make using technology in combination with the common assignments a priority". Scholars also provided some beginning questions for revising course assignments:

- What about successful assignments appeals to students?
- Can these aspects be highlighted and maximized?
- Does the assignment allow students to explore career applications or ways to make a difference in the community?
- Does technology support determining trustworthy sources and using information in a productive manner?
- Can expectations for collaboration be guided or altered for those who prefer or need direction to work alone?
- Does the timetable support students' completion of segments that contribute to a larger whole while avoiding binging to get it done?

Moreover, "some course-evaluation forms request student assessment of what are considered 21st-century objectives. These objectives can be used to refine assignments and highlighted in the course syllabus. To avoid some of the paradoxes and pitfalls described above, additional recommendations for faculty working to improve course assignments: • Give choices and a sense of freedom, if possible, but be willing to provide examples and give guidance. For example, students can be given instructions to show how ways to motivate others (e. g., granting choice, control, collaboration, challenge, creativity) is evident in a lesson plan or team project and argue for which element might be most impactful. • Explain how assignments could help students to make a difference in their lives and the communities. For instance, students can be expected to consider both immediate and long-term benefits of conservation or recycling initiatives. • Be more purposeful in assigning group tasks. Carefully explain the rationale for working in teams or groups, what the individual responsibilities are, and how they will be consolidated into a whole to solve a problem. Collaborating online before meeting in person might help students prepare for strong group participation. • Require students to combine skills and strategies to propose a change that they could enact. An example is making a poster to argue for a new law and writing a letter to a legislator as a more personal plea. • Promote informational literacy. Help students select and critically consume online resources. Point out more reliable sources and model how to analyse, summarize, and synthesize the content. Consider having students search for appropriate sites and sources for information as a first step, and then follow up with comparing the sites to determine which two provide the most reliable and unbiased information. These tasks could be due at different times and evaluated separately. • If possible, leverage aspects of "destiny assignments" to frame tasks. According to Fandom, an entertainment news website for updates on films, games and television series, one power available in some online games is to assign and re-assign the destinies of another or oneself. Thus, a destiny assignment is the power to manipulate or re-assign the fate of a character. Searching the terms destiny assignment and prosperity and purpose reveals a full-blown movement in support of personal development that interests young adults. Assignments that challenge students to initiate and document change in themselves and others or that envision their future-selves might have long-lasting appeal", says author. Third, Some Ways to "Talk the Walk" with Contemporary Students: the way instructors frame assignments might be more important than ever, instructors should carefully explain the rationale and value of assignments. Scholars also proposed some comments that university educators could use to promote course assignment, says author:

- 'You'll need this on the job'
- 'We're here to equip you to make real differences in your life and that of others'
- 'Professionals in this field need to know and apply these essential concepts."
- 'Knowing how to do this will help you make important decisions on the job.'
- 'I know that you probably don't want to let others down, so pay attention to this.'
- 'I want to help you be the best you can be'
- 'This task may be challenging, but it can be well worth your effort'

Conclusion

In short, in general a circumstance, encounters, theories, processes, the system of education has always changed on the basis of the newest condition in the world. Indeed, at this time of the pre-mid-post COVID 19 pandemic, there was a general attack on human beings and on the nature of the disease. Education is one of the prior sectors influenced by COVID19 until the time I wrote this article. As a holistic process, then, likes or disapproves, education must be linked to shifting. In other words, the whole reflection of the system also means that the educational agent who is a teacher, a stakeholder, a learner, an educational community that involves a practitioner must be aware of the changes; improvement does not mean that mistakes are imminent, but at the same time encourages and promotes the education system in a measurable approach to the purpose of education. As a human person, the weaknesses could be missed separately, yet by coordination, eagerness, and observable – once again, I have addressed the topic – I conclude that either this pandemic will take a long time to be affected, yet that education would also be able to provide and reinforce the balance between the spirits of sustainable education.

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