Identifying Key Component of Collaborative Problem Solving in Teaching and Learning Process: The Challenges Ahead in Preparing for 21st Century Skills

Muhammad Sarlin
Universitas Negeri Gorontalo

Arfan Arsyad
Universitas Negeri Gorontalo

Ikhfan Haris
Universitas Negeri Gorontalo

In recent years many researchers have paid close attention to and conducted extensive research on Collaborative Problem Solving (CPS). This is because many complex projects in the modern world can only be completed through teamwork. However, education and training that emphasize the systematic strengthening of the CPS aspect are still insufficient in preparing graduates to enter the workforce. In fact, CPS as one of the most important skills in the 21st century besides critical thinking, communication, creativity, and innovation. This paper deals with the CPS as an important skill in 21st Century. The first part of the paper attempt to explicate the basic concept of CPS. Subsequently, Collaboration and Problem-Solving Process in the context of teaching and learning processes will be presented in the next section. Besides, a conceive illustrated of Assessment Framework of 2015 PISA CPS will also described. The article is devoted to explain the Dimensions and Elements of CPS Assessment; in particular, the social domain of collaborative problem-solving as well as Cognitive domain of CPS are discussed.

Keywords: assessment, collaborative, problem solving, process, skill, student

INTRODUCTION

Education is always faced with the challenge of producing quality graduates. Aside from the scientific field, the graduate should have additional competencies to increase bargaining power when entering the workforce (Casner-Lotto & Barrington, 2006; Wagner, 2010). These are critical, because recruitment do not only require graduates with a strong knowledge base, but also insight into independence and other skills, such as collaboration, and critical thinking (Funke, 2010; Fiore et al., 2015). Therefore, it is necessary to redefine and re-prioritize graduates' skills for them to be capable and successful in their work and careers (Liu et al., 2012; Levy & Murnane, 2013; Griffin, 2017). In 2015, the Organization for Economic Co-operation and Development (OECD) published a draft framework that included CPS as a skill requirement in education and the workplace, as well as CPS being added to the PISA test. This inclusion has significant implications for educational assessment and creates a challenge for graduates to achieve CPS skills

(Graesser & Foltz, 2013). The Educational Progress Global Test-PISA 2015 results show a low level of CPS proficiency from 52 OECD countries, with only 8% of students having collaborative problem-solving skills. Also, as many as 6% of 500,000 students do not even achieve Level 1 proficiency (OECD, 2017).

The PISA test results not only highlight the significant societal need for preparing graduates with CPS skills to enter the workforce and develop their careers, but they also present opportunities for education practitioners to develop, adopt, and apply theories and empirical research on CPS. Furthermore, it promotes the development of policies to improve education/training related to CPS-oriented learning.

Defining of Collaborative Problem -Solving

Collaborative Problem Solving (CPS) is a combination of collaborative and problem-based learning. Both approaches have been long examined simultaneously and partially in-depth by scientists (Klein et al., 2006; Salas et al., 2008; Sonnentag & Lange, 2002; Nash et al., 2003; Wuchty et al., 2007).

Collaboration can be understood as working together. It is a synchronous and coordinated activity that resulted from an ongoing effort to establish and maintain a shared conception of a problem (Roschelle & Teasley, 1995, Luckin et al., 2017). For collaboration, social interaction is vital but insufficient because some social connections do not involve shared goals, accommodation from different perspectives, or organized efforts to achieve goals.

The concept of Problem Solving refers to the individual's capacity to carry out cognitive processes to understand and solve problems, including a willingness to engage with certain situations to achieve constructively as well as reflective potential, when solution-solving methods are not available clearly and quickly (Rowe, 1985; Marzano, 2003), 1988; Mayer, 1990; OECD 2010).

As two interrelated concepts, CPS is the individuals' ability to effectively engage in a process to solve a problem by sharing an understanding and the effort required to decipher by sharing knowledge and skills (PISA 2015).

The Competencies in Collaboration and Problem-Solving

The collaboration dimension has three main competencies, namely (1) the concept of developing and maintaining a common understanding. Students must identify shared knowledge (what each other knows about the problem), collaborate perspectives, build a shared vision of the types of problems and activities, as well as monitor and maintain relevant knowledge in problem-solving. Concrete actions include responding to information requests, sending team members information on task completion, verifying what each other knows, negotiating agreements, and correcting communication breakdowns; (2) Ideas in taking appropriate actions to solve problems. In this case, students must identify the types of CPS activities needed to solve problems and take appropriate steps, including both physical and communication actions; (3) The idea of establishing and maintaining a team organization. Students must organize and monitor teams to solve problems; consider team members' interests, resources, and assets; understand the roles of various members; follow the steps relevant to the assigned role, and reflect on the team's success.

Specifically, to tackle complex problems successfully, four problem-solving processes are required, namely: (1) Ideas to explore and understand. At this stage, students need to interpret initial information about the problem revealed during exploration and interaction with the problem; (2) The concept of representing and formulating. Students must select, organize, and integrate information with prior knowledge. The process includes the use of graphs, tables, symbols, or words and; (3) The planning and implementation process, which includes identifying problem objectives, setting sub-goals, developing plans to achieve goals, and executing plans, also; (4) Monitoring and reflection. Students are expected to monitor the steps in the plan to achieve the goal state, mark progress, reflect on the quality of the solution, and revise the plan when obstacles arise (Funke, 2010; Greiff et al., 2013; OECD, 2010).

Assessment Framework of 2015 PISA CPS

The PISA assessment framework has two dimensions, namely the cognitive (work assignments) and collaborative dimension (teamwork). The problem-solving dimension in the PISA framework includes the four 2012 PISA competencies that focus on individual problem-solving (Funke, 2010; Greiff et al., 2014; OECD, 2010).

The four competencies targeting personal problem-solving in the PISA framework 2021 are (1) Exploring and understanding. This stage is carried out by interpreting the initial information about the problem and what information was found and how the problem was interacted with during learning; (2) Representing and formulating. This stage entails identifying common problem-solving approaches, procedural strategies, and relevant artifacts (e.g. graphs, tables, formulas, symbolic representations) to help solve problems; (3) Planning and implementation. This stage involves establishing and enforcing a structure of goals, plans, steps, and actions to solve problems. Physical, social, or verbal actions may be taken, and; (4) Monitoring and reflection. This stage includes tracking steps in the plan to achieve goals, mark progress, and reflect on the quality of solution progress.

CPS Collaborative Problem-Solving (CPS) Process

In PISA CPS 2015 (OECD, 2017), there are three dimensions of the collaboration process namely: (1) Building and maintaining a common understanding. It is carried out by tracking each other team's/member's understanding of the problem, for example: sharing knowledge, commonalities, team member perspectives, and understanding the essence of problems and activities; (2) Taking appropriate action to solve the problem, according to the steps to reach a solution. This includes physical and communication actions that become solutions to the problem and; (3) Establishing and maintaining group organization. It involves assisting in the organization or rearrangement of groups based on the group members' knowledge, skills, abilities, and resources, in addition, it includes following the rules of engagement for specific roles and groups, as well as handling barriers to tasks assigned to other team members (Wegner, 1986; H. Clark, 1996; Cannon-Bowers & Salas, 2001; Dillenbourg & Traum, 2006).

Moreover, associating four problem-solving processes with three collaborative processes resulted in 12 CPS assessment skills with four important indicators, namely: (1) Task characteristics, by making many differences, such as between interdependent or independent solutions, clear or unclear problems, problems that are static or dynamically changing, and team members who have the same or different goals; (2) A problem scenario that divided into different problem categories, for example, Jigsaw, consensus, or negotiation as well as content differences, such as private or public issues, technical or non-technical subject matter, and school or non-school contexts; (3) Team composition that can do function with symmetrical or asymmetrical status, the same or different roles, and be part of a variety of groups and; (4) Characteristics of team members. Individual team members have a wide range of knowledge (mathematics, reading and writing, science, or everyday knowledge) as well as psychological attributes, including disposition and attitude, motivation, and cognitive skills.

Dimensions and Elements of CPS Assessment

The 2015 PISA conceptual framework and the ATC21S (Assessment and Teaching of 21st Century Skills) define two components of skills in CPS, namely social skills and cognitive skills.

The Social Domain of Collaborative Problem-Solving

The social skills assessment rubric includes participation, understanding perspective, and social regulation. Each skill is defined as a set of elements and evidence or indicative behavior needed to conclude that the student demonstrates the skill.

To determine whether someone is a good participant three sub-skills are used, namely: (1) action; (2) interaction; and (3) task completion. Action is defined as a person's overall level of participation, regardless of whether these actions are coordinated with the efforts of others. Within a group, problem solvers have different levels of competence. Some problem solvers may be passive, but others become active when stimulated and given sufficient support, also others will demonstrate the ability to act independently and on their initiative. In addition, interaction refers to the capacity to respond to or coordinate with others, which can range from answering questions to actively initiating and coordinating efforts, or assisting others to respond. Moreover, task completion skills are related to aspects of participation motivation, including a sense of responsibility for the results of collaborative efforts. It can also be described as persistence or toughness.

Understanding perspective is the ability to understand a situation from another person's point of view, to apply contextual knowledge in interpreting the information provided by others, and to adapt one's statements or actions in response to the needs and alleged understanding of the listener/observer. Within the framework of collaborative problem-solving assessment, there are two sub-elements of perspective understanding skills, namely responsiveness and audience awareness skills. Responsiveness refers to the capacity to integrate collaborators' contributions into one's thoughts and actions, whereas audience awareness is the potential to adapt one's contributions to the anticipated or expressed needs of others, or to make actions visible and understandable to collaborators.

The diversity of knowledge and experience that group members bring to problem-solving is the potential benefit of collaboration. However, the best diversity supports collaborative efforts when participants understand how to address differing viewpoints or when they have strong skills or elements of social regulation.

There are four sub-elements related to social regulation skills, namely: (1) Indicative metamemory, defined as the ability to evaluate a person's knowledge, strengths, and weaknesses. It is a reflective capacity which focuses on working and learning methods for the skills that they have demonstrated; (2) Indicative behavior, which is transactive memory that describes a person's understanding of the knowledge, strengths, and weaknesses of collaborative partners. This is a reflective process in which behavior and performance are considered in terms of how successful or valuable their partner is in contributing to acquire a solution; (3) Negotiation skills, which are revealed when disagreements between partners are resolved. Successful collaborators must find ways to reconcile opposing perspectives and/or accommodate differences and; (4) Initiative responsibility, i.e. consider how problem solvers differ in taking initiatives in collaborative contexts. The focus is primarily on individual tasks, while others work on the representation of shared problems, strategic plans offered to lead towards solutions, and regular progress monitoring. Also, it is possible to regard responsibility and initiative skills as evidence of leadership.

Cognitive Domain of Collaborative Problem-Solving

Individual and collaborative problem-solving have the same key cognitive skills, particularly the individual's task management tactics and reasoning abilities. Also, the overall structure of the cognitive skills' domain assessment framework is similar to that of the social domain. Moreover, CPS's cognitive domain has two components, including task regulation and knowledge building. Each element describes a special skill that must be demonstrated (Scoular et al., 2017; Graesser et al., 2018).

The Task Management Skills component refers to the fact that most collaborative problem-solving tasks can only be completed with available resources and information elements about them are collected and shared. As a result, data collection and management of the available resources for individuals and collaborators is an important aspect of flexibility and ambiguity planning. To assess planning skills, six sub-skills must be distinguished: (1) problem analysis; (2) goal setting; (3) resource management; (4) flexibility; (5) data collection, and; (6) systematic.

The Knowledge Building Skills component focuses on Learning Skills in collaborative problem-solving tasks. Individuals can learn about content domains, strategies, and how to deal with setbacks, as well as how to coordinate, collaborate, and negotiate with others. In another approach to solving complex problems, the hierarchies for cognitive development include (1) Relationships with data, i.e. recognizing associations and patterns in data while collaborators seek to build a collection of information to define problem spaces collaboratively and to identify connections between actions and consequences, between observations and patterns, and to identify gaps in the knowledge needed to make progress. Students in the first category, usually rely on identifying isolated elements of information. Trial and error is essentially an individual approach that indicates a very low level of collaborative problem-solving skills. These elements must be shared in collaborative settings where resources and information are distributed unequally. Problem solvers at this skill level generally describe the relationship between elements of information (data) and patterns of observation that can be shared among collaborators; (2) Contingency, i.e. at this level of knowledge development, systematic observation of cause and effect allows players to formulate and discuss potential rules, either for task arrangements or collaborative ways. At a higher level, (if-then) rules are used to complete a step or part of a problem solution. This requires planning multiple paths to a solution. Collaborators also need to discuss and evaluate suggestions for progress towards a problem solution and the consequences of each action or decision, and; (3) Hypotheses, in which the collaborating partners must propose generalizations about events in the problem-solving solution strategy and be able to formulate and test hypotheses. This could be as simple as collaborating partners suggesting to each other, "how about we try this" or "whether it happens or not depends on what happens". This is tantamount to partners collaborating in a problem-solving space making educated guesses or testing hypotheses. For more complex sub-tasks, better students demonstrate the ability to generalize various situations by establishing and testing hypotheses by using the "what if...?" approach (Griffin, 2014).

ACKNOWLEDGEMENT

This manuscript is one of the research outputs of Fundamental Research grant scheme, which funded by Government Indonesia through DRPM. Thank you to the Kementerian Riset dan Teknologi /Badan Riset dan Inovasi Nasional for funding support to this research project. The authors would like also greeting to the Universitas Negeri Gorontalo, Indonesia as well as the sample schools in Kabupaten Gorontalo that have provided assisted during the conducting of this research.

REFERENCES

Agustina, L., Sugiyarto, & Sarwanto. (2016). Penerapan Model Pembelajaran Kooperatif Numbered Head Together (NHT) dan The Power of Two ditinjau dari Motivasi Belajar dan Gaya Belajar Siswa, *Proceeding Biology Education Conference*, *13*(1), 83–89.

Al Harthy, S.S.H., Jamaluddin, S., & Abedalaziz, N.A. (2013). Teachers' Attitudes and Performance : An Analysis of Effects Due to Teaching Experience. *International Interdisciplinary Journal of Education*, *2*(9), 889–894. https://doi.org/10.12816/0002957

Alfieri, L., Brooks, P.J., Aldrich, N.J., & Tenenbaum, H.R. (2011). Does discovery-based instruction enhance learning? *Journal of Educational Psychology*, *103*(1), 1–18. https://doi.org/10.1037/a0021017

Attard, A., Ioio, E.D., Geven, K., & Santa, R. (2011). Times for a new paradigm in education: Student centered learning: SCL Toolkit. Bucharest, Romania: *The European Student Union*, pp. 153–172. https://doi.org/10.1007/978-94-007-3937-6_9

Bashith, A., & Amin, S. (2018). Comparative Analysis of Social Science (IPS) Learning Design on KTSP and K-13 Curriculum in Madrasah Tsanawiyah (MTs). *Proceedings of the 1st International Conference on Recent Innovations.* https://doi.org/10.5220/0009926312761284

Beghetto, R.A., & Kaufman, J.C. (2007). Toward a broader conception of creativity: A case for mini-c creativity. *Psychology of Aesthetics, Creativity and the Arts*, *1*(2), 73–79. https://doi.org/10.1037/1931-3896.1.2.73

Bernstein, D.A. (2018). Does active learning work? A good question, but not the right one. *Scholarship of Teaching and Learning in Psychology*, *4*(4), 290–307. https://doi.org/10.1037/stl0000124

Bray, A., Byrne, P., & O'Kelly, M. (2020). A Short Instrument for Measuring Students' Confidence with 'Key Skills' (SICKS): Development, Validation and Initial Results. *Thinking Skills and Creativity*, *37*, 100700. https://doi.org/10.1016/j.tsc.2020.100700

Cattaneo, K.H. (2017). Telling active learning pedagogies apart: From theory to practice. *Journal of New Approaches in Educational Research*, *6*(2), 144–152. https://doi.org/10.7821/naer.2017.7.237

Cohen, M., Buzinski, S.G., Armstrong-Carter, E., Clark, J., Buck, B., & Rueman, L. (2019). Think, pair, freeze: The association between social anxiety and student discomfort in the active learning environment. *Scholarship of Teaching and Learning in Psychology*, *5*(4), 265–277. https://doi.org/10.1037/stl0000147

Cowan, N. (2013). Working Memory Underpins Cognitive Development, Learning, and Education. *Educational Psychology Review*, *26*(2), 197–223. https://doi.org/10.1007/s10648-013-9246-y
Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & Osher, D. (2019). Implications for educational practice of the science of learning and development. *Applied Developmental Science*, *24*(2), 97–140. https://doi.org/10.1080/10888691.2018.1537791
De Boeck, P., & Scalise, K. (2019). Collaborative Problem Solving: Processing Actions, Time, and Performance. *Frontiers in Psychology*, *10*. https://doi.org/10.3389/fpsyg.2019.01280
Deslauriers, L., McCarty, L.S., Miller, K., Callaghan, K., & Kestin, G. (2019). Measuring actual learning versus feeling of learning in response to being actively engaged in the classroom. *Proceedings of the National Academy of Sciences*, *116*(39), 19251–19257. https://doi.org/10.1073/pnas.1821936116
Duch, B.J., Groh, S.E, & Allen, D.E. (Eds.). (2001). *The power of problem-based learning*. Sterling, VA: Stylus.
Dunlosky, J., Rawson, K.A., Marsh, E.J., Nathan, M.J., & Willingham, D.T. (2013). Improving Students' Learning With Effective Learning Techniques. *Psychological Science in the Public Interest*, *14*(1), 4–58. https://doi.org/10.1177/1529100612453266
Ersoy, E., Şendurur, E., & Çetin, İ. (2017). The Creativity Dimension of Instructional Materials Designed by Prospective Teachers: The Comparison across Domains. *ITM Web of Conferences*, *13*. https://doi.org/10.1051/itmconf/20171301011
Faisal, & Martin, S.N. (2019). Science education in Indonesia: past, present, and future. *Asia-Pacific Science Education*, *5*(1). https://doi.org/10.1186/s41029-019-0032-0
Freeman, S., Eddy, S.L., McDonough, M., Smith, M.K., Okoroafor, N., Jordt, H., & Wenderoth, M.P. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences*, *111*(23), 8410–8415. https://doi.org/10.1073/pnas.1319030111
Garrett, T. (2008). Student-Centered and Teacher-Centered Classroom Management: A Case Study of Three Elementary Teachers. *Journal of Classroom Interaction*, *43*(1), 34–47
Gaskins, N.R. (2021).Remixing in Teaching and Learning. Book Chapter in Techno-Vernacular Creativity and Innovation. https://doi.org/10.7551/mitpress/12379.003.0011
Grasha, A.F. (1996). *Teaching with style: A practical guide to enhancing learning by understanding teaching and learning styles.* Pittsburgh: Alliance Publishers.
Green, C., & Harrington, C. (2020). *Student-centered learning: In principle and in practice*. Lansing, MI: Michigan Virtual University. Retrieved from https://michiganvirtual.org/research/publications/student-centered-learning-in-principle-and-in-practice/
Han, S., Capraro, R., & Capraro, M.M. (2015). How science, technology, engineering, and mathematics (STEM) project-based learning (PBL) affects high, middle, and low achievers differently: The impact of student factors on achievement. *International Journal of Science and Mathematics Education*, *13*(5), 1089–1113. https://doi.org/10.1007/s10763-014-9526-0
Harris, N., & Bacon, C.E.W. (2019). Developing cognitive skills through active learning: A systematic review of health care professions. *Journal of Athletic Training*, *14*(2), 135–148. https://doi.org/10.4085/1402135
Hunter, R., Hunter, J., Jorgensen, R., & Choy, B.H. (2016). Innovative and Powerful Pedagogical Practices in Mathematics Education. *Research in Mathematics Education in Australasia 2012–2015*, pp. 213–234. https://doi.org/10.1007/978-981-10-1419-2_11
Hutagaol, K. (2018). Strategi Multi Representasi dengan Kemampuan Pemecahan Masalah Matematis Siswa. *Jurnal Padegogik*, *1*(1), 1–11. DOI: https://doi.org/10.35974/jpd.v1i1.636
K. Nguyen et al., (2017). Students' expectations, types of instruction, and instructor strategies predicting student response to active learning. *International Journal of English Education*. 33, 2–18
Keiler, L.S. (2018). Teachers' roles and identities in student-centered classrooms. *IJ STEM Ed*, *5*, 34. https://doi.org/10.1186/s40594-018-0131-6

Kennedy, G., & Lodge, J.M. (2016). All roads lead to Rome: Tracking students' affect as they overcome misconceptions. In S. Barker, S. Dawson, A. Pardo, & C. Colvin (eds.), *Show Me the Learning. Proceedings ASCILITE 2016* (Adelaide, SA), pp. 318–328.

Lehman, B., D'Mello, S., & Graesser, A. (2013). Who benefits from confusion induction during learning? An individual differences cluster analysis. In K. Yacef, C. Lane, J. Mostow, & P. Pavlik (eds.), *Proceedings of 16th International Conference on Artificial Intelligence in Education* (pp. 51–60). Berlin: Springer.

Leksono, A.W., Vhalery, R., & Maranatha, S. (2018). Cooperative learning model: The power of two vs tea party. *International Journal of Research and Review*, *5*(12), 80–88.

Leng, L. (2020). The Role of Philosophical Inquiry in Helping Students Engage in Learning. *Frontiers in Psychology*, 11. https://doi.org/10.3389/fpsyg.2020.00449

Li, W. (2022). Studying creativity and critical thinking skills at university and students` future income. *Thinking Skills and Creativity*, *43*, 100980. https://doi.org/10.1016/j.tsc.2021.100980

Lodge, J.M., Kennedy, G., Lockyer, L., Arguel, A., & Pachman, M. (2018). Understanding Difficulties and Resulting Confusion in Learning: An Integrative Review. *Frontiers in Education*, *3*. https://doi.org/10.3389/feduc.2018.00049

Love, A.G., Dietrich, A., Fitzgerald, J., & Gordon, D. (2014). Integrating collaborative learning inside and outside the classroom. *Journal on Excellence in College Teaching*, *25*(3&4), 177–196.

Martin, S.N., & Chu, H.E. (2015). Asia-Pacific Science Education (APSE): Expanding opportunities for publishing science education research. *Asia-Pacific Science Education*, *1*(1). https://doi.org/10.1186/s41029-015-0006-9

Muhamad, T., & Mustofa, A. (2013). *Belajar dan Pembelajaran*, Jakarta: Ar-Ruzz Media Cetakan-II.

Muhammad, N.A., Ayob, S., & Ramli, I. (2017). Alternative teaching method: The needs assessment of interactive e-content application in teaching art history course. *International E-Journal of Advances in Education*, pp. 77–77. https://doi.org/10.18768/ijaedu.309805

Narciss, S. (2004). The Impact of Informative Tutoring Feedback and Self-Efficacy on Motivation and Achievement in Concept Learning. *Experimental Psychology*, *51*(3), 214–228. https://doi.org/10.1027/1618-3169.51.3.214

Nesbit, J., & Adesope, O. (2006). Learning with concept and knowledge maps: A meta-analysis. *Review of Educational Research*, *76*(3), 413–448. https://doi.org/10.3102/00346543076003413

Nguyen, K., Husman, J., Borrego, M., Shekhar, P., Prince, M., DeMonbrun, M., . . . Waters, Ck. (2017). Students’ Expectations, Types of Instruction, and Instructor Strategies Predicting Student Response to Active Learning. *International Journal of Engineering Education*, *33*, 2–18.

Nida, S., Rahayu, S., & Eilks, I. (2020). A Survey of Indonesian Science Teachers’ Experience and Perceptions toward Socio-Scientific Issues-Based Science Education. *Education Sciences*, *10*(2), 39. https://doi.org/10.3390/educsci10020039

Nofriansyah, Martiah, A., & Vhalery, R. (2018). The Effect Of Learning Model Logan Avenue Problem Solving Heuristic To The Students Learning Activity. *International Journal of Scientific and Research Publications (IJSRP)*, *8*(10). https://doi.org/10.29322/ijsrp.8.10.2018.p8236

Omiyefa, M.O., & lijadu, M.O. (2014). Utilizing Concepts And Generalizations In Selecting And Organizing Social Studies Contents. *Historical Research*, *10*(27).

Parker, L. (2017). Religious environmental education? The new school curriculum in Indonesia. *Environmental Education Research*, *23*(9), 1249–1272. https://doi.org/10.1080/13504622.2016.1150425

Patel, D.A. (2019). Effects of 5E learning Cycle Model on Achievement in Social Science of Std-8. *International Journal of Trend in Scientific Research and Development*, *3*(3), 1836–1837. https://doi.org/10.31142/ijtsrd21726

Pham Thi Hong, T. (2011). Issues to consider when implementing student-centred learning practices at Asian higher education institutions. *Journal of Higher Education Policy and Management*, *33*(5), 519–528. https://doi.org/10.1080/1360080x.2011.605226

Poatob, S. (2015). Understanding the Goal of Social Studies: A Step to the Effective Teaching of the Subject. *Research on Humanities and Social Sciences*, *5*(8), 182–193.
Prince, M. (2004). Does active learning work? A review of the research. *Journal of Engineering Education*, *93*(3), 223–231. https://doi.org/10.1002/j.2168-9830.2004.tb00809.x
Quarshigah, A.Y. (2000). Social studies teaching: A study of pedagogy for global perspective education. *Southern Social Studies Journal*, *26*(1), 44–63.
Sargeant, J. (2012). Qualitative Research Part II: Participants, Analysis, and Quality Assurance. *Journal of Graduate Medical Education*, *4*(1), 1–3. https://doi.org/10.4300/jgme-d-11-00307.1
Shiveley, J., & Misco, T. (2009). Reclaiming generalizations in social studies education. *Social Studies Research and Practice*, *4*(2), 73–78.
Silverthorn, D.U., Thorn, P.M., & Svinicki, M.D. (2006). It's difficult to change the way we teach: Lessons from the Integrative Themes in Physiology curriculum module project. *Advances in Physiology Education*, *30*(4), 204–214. https://doi.org/10.1152/advan.00064.2006
Sternberg, R.J. (2012). The Assessment of Creativity: An Investment-based Approach. *Creativity Research Journal*, *24*(1), 3–12. https://doi.org/10.1080/10400419.2012.652925
Sternberg, R.J. (2015). Teaching for creativity: The sounds of silence. *Psychology of Aesthetics, Creativity, and the Arts*, *9*(2), 115–117.
Sugiyono. (2010). *Metode Penelitian Kuantitatif Kualitatif & RND*. Bandung: Alfabeta.
Sunal, C.S., & Haas, M.E. (2005). *Social studies for the elementary and middle grades: A constructivist approach.* Boston: Pearson, Allyn & Bacon.
Thomas, T. (2009). Active learning. In E. F. Provenzo (Ed.), *Encyclopedia of the social and cultural foundations of education*. Sage Publications.
Ucus, S. (2017). Exploring Creativity in Social Studies Education for Elementary Grades: Teachers' Opinions and Interpretations. *Journal of Education and Learning*, *7*(2), 111. https://doi.org/10.5539/jel.v7n2p111
Uttl, B., White, C.A., & Gonzalez, D.W. (2017). Meta-analysis of faculty's teaching effectiveness: Student evaluation of teaching ratings and student learning are not related. *Studies in Educational Evaluation*, *54*, 22–42. https://doi.org/10.1016/j.stueduc.2016.08.007
Vale, C., Weaven, M., Davies, A., & Hooley, N. (2010). Student centred approaches: Teachers' learning and practice'. Paper presented at the Shaping the future of mathematics education: *Proceedings of the 33rd annual conference of the Mathematics Education Research Group of Australasia*. Retrieved 21 March 2022, from http://www.merga.net.au/documents/MERGA33_ ValeEtAl.pdf
Vhalery, R., & Nofriansyah. (2018). Cooperative Learning in the Learning Activity of Students. *International Journal of Scientific and Research Publications (IJSRP)*, *8*(9). https://doi.org/10.29322/ijsrp.8.9.2018.p8110
Webb, N.M., Farivar, S.H., & Mastergeorge, A.M. (2002). Productive Helping in Cooperative Groups. *Theory Into Practice*, *41*(1), 13–20. https://doi.org/10.1207/s15430421tip4101_3
Wright, G.B. (2011). Student-centered learning in higher education. *International Journal of Teaching and Learning in Postsecondary Education*, *23*(1), 92–97.
Yazid, A. (2012). Pengembangan Perangkat Pembelajaran Matematika Model Kooperatif dengan Strategi TTW (Think-Talk-Write) pada Materi Volume Bangun Ruang Sisi Datar. *Journal of Primary Educational*, *1*(1), 31–37.