Inquiry-based collaborative learning:

A Literature Review

by

Andrew Vogelsang

Bachelor of Arts, Simon Fraser University, 2007
Bachelor of Education, University of Northern British Columbia, 2011

A Literature Review Submitted in Partial Fulfillment
of the Requirements for the Degree of

MASTER OF EDUCATION

in the Department of Curriculum and Instruction

© Andrew Vogelsang, 2021
University of Victoria

This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License (CC BY-NC 4.0)

Introduction

The ideas behind what we want to accomplish with this project, touch on a myriad of existing areas of research. This literature review will cover constructivism as a theoretical framework, followed by sections on project-based learning, collaboration, co- teaching, and inquiry-based learning.

Theoretical Framework: Constructivism

According to Audrey Gray (1997), "Constructivist teaching is based on the belief that learning occurs as learners are actively involved in a process of meaning and knowledge construction rather than passively receiving information. Learners are the makers of meaning and knowledge" (para 3). This is essential in a day and age where people must look beyond theory and apply it in the real world. The areas of knowledge, specifically for my subject area, the technology field, are growing and adapting at an alarming rate. According to the Canadian Government, the technology industries "[s]trong growth continued in 2019 as the sector grew by 4.8%, outpacing the Canadian economy growth of 1.5% by over three percentage points" (Spectrum & Sector, 2020, para 5). Furthermore, the constructivist framework allows for a more multi-modal form of learning that is designed to place classroom learning with real-world practice. This thought is echoed in the works of Harfitt and Chan (2017), who state, "Students move between theories derived from books and lectures to direct experiences based on the well-established premise that we construct knowledge through a combination of direct experience, reflection and guided learning" (p. 546).

The premise of learning through doing is not new, and neither is the constructivist viewpoint. Educational theorists, such as Piaget, have looked at the idea of theory moving into

practice. According to Jordan and Porath (2006), Piaget believed, "[l]earners are not vessels into which knowledge is to be poured and then absorbed; instead they are involved in the knowledge-building exercise with the teacher" (p. 47). Knowledge discovered, and not wholly imbued by a teacher, is powerful and lasting.

However, there are those who disagree with the constructivist viewpoint. Simpson (2002) argues that the theory of constructivism is ill-defined and therefore not a true theory. He argues, " … there is no one true way of constructivism; one person's version is likely to differ from another's … one version cannot claim to be the true version" (p. 1). Though I agree with the statement that the implementation of constructivism may differ based on each individual educator, I also believe that these educational theories need not be as structured as the scientific method. I believe that Simpson's perspective was too narrow and limiting. Furthermore, Dagar and Yadav (2016) write, "[c]onstructivist pedagogy in which activity supplements lecture, learners are provided opportunities to construct their own understanding on the basis of an interaction between what they already know" (p. 4). Overall, the constructivist framework, with its mix of theory and then practice, makes for a more well-rounded and complete theory of student learning.

Project-based Learning

Project-based learning (PBL) is premised on the idea that students will gain skills and knowledge by answering a question that is both engaging and complex. Gary (2015), an associate professor in the School of Computing at Arizona State University, speaks to computing knowledge as being agile, meaning that no two assignments or creations are the same. Gary further alludes to the traditional teaching of lecture and lab work as adequate and at times beneficial. However, he points out the problem that students are learning the base structure of

how to do things, but are not learning how these things are put together in the bigger picture of a project. Lam et al. (2010) talk about the efficacy of PBL in the classroom and the supports needed to make PBL viable. They looked at how support influenced the teachers' willingness to work in a PBL environment. They surveyed 182 teachers in the Hong Kong area to gauge their willingness to work with others in a PBL environment. What they found was, "...when teachers perceived their schools as being stronger in collegiality and more supportive of teacher competence and autonomy, they had higher motivation in project-based learning and stronger willingness to persist in this educational innovation" (p. 487). Though they acknowledge that their study, being a survey, may have a minor correlational issue, the results are important as it highlights the idea that will be present in our project, that being the willingness, and the ability, of the staff, and the school, to take on a project like this. The authors state that three supports are essential to the success of PBL: competence, collegiality, and autonomy. This article shows that supports are required if one is to use PBL.

Gary (2015) and Lam et al. (2010) are great examples as to where we are, in relation to theoretical knowledge and PBL practice. The two points these articles make are that PBL is important to allow the learners to take the knowledge from the specific and apply it in a less concrete, more contextual approach. Furthermore, it also shows that there must be the supports in place to make it functional and meaningful for the learners. Our group's project has to pay close attention to some of the issues that were raised in these studies.

Assessment and clear expectations are crucial to the outcome. Gary (2015) mentions that assessment may be problematic when everyone is doing something different. Suzie Boss (2012) argues that methods of assessment, that reflect learning in standardized test formats, like those implemented for No Child Left Behind programs in the United States would have trouble to

capture the intent of PBL. She states that, “[r]ather than testing for recall of information, projects are better suited to performance-based assessments that ask students to demonstrate, apply and reflect on what they have learned” (para 3). Furthermore, this is echoed in the new British Columbia (BC) Ministry of Education (2017) Curriculum, where it states, “classroom assessment tools and resources developed by the Ministry will employ frameworks like Webb’s Depth of Knowledge [DOK] to support teachers in assessing deeper learning” ("Educator Update: Classroom Assessment”, p. 2). Hess et al. (2009) break down the four levels of DOK:

1) Recall and Reproduction,

2) Skills and Concepts,

3) Strategic thinking and Reasoning, and

4) Extended thinking (p.4).

With the new BC curriculum pushing for higher DOK, PBL is perfect for the new standards, especially in applied skills settings.

This is a paradigm shift for most teachers in establishing new methods and benchmarks for assessment. Further, how to assess has been a divisive issue in the past, with those who prefer the method they know and are comfortable with. It is hard to make a switch, even if just for one classroom unit.

Collaboration

Collaboration is essential in the project that we are doing. The teachers will be collaborating with each other on the design of the overall project, and the learners will be collaborating on their section of the project. Though collaboration is not a new idea, the use of collaboration, across more than a singular assignment, is gaining acceptability.

Pugach et al. (2011) discuss the importance of teaching preservice teachers, in their teaching education programs, the validity and inclusiveness of the collaborative framework. They posit that, in special and general education, the history of inclusion has been less successful than it could be, and that teachers in training need to learn collaborative practices to truly incorporate all learners in an inclusive classroom. If teachers do not know how to work with others, and are inclined to stay in their own classrooms, the inclusiveness of any classroom may suffer by failing to refine and direct one's practice. Hedegaard-Soerensen et al. (2017) have similar findings to Pugach et al. (2011), in that this kind of collaboration will benefit all students socially, behaviourally, and academically. Hedegaard-Soerensen et al. (2017) also look at the steps required for good collaboration. They reference a Gottlieb and Rathmann's (2014) article, which they translated into English, and report that they,

> ...identify four different categories of collaboration: (1) Giving advice and prescribing solutions to specific problems, (2) counselling directed towards specific solutions and new understandings of and different, new perspectives on problems, (3) offering inspiration to the teacher from new knowledge, new insights and understandings in order to support teachers' search for new teaching approaches, and (4) being a discussion partner in order to support teachers' reflections and analysis of practice. (p. 390)

It is important to see that there are different categories of collaboration, and therefore the idea of collaboration is not a set practice, but instead a vehicle to learn and grow organically as professionals and as learners.

It is valuable to note that collaboration works best when it is organic and undertaken with willing participants. Krammer et al. (2018) discuss the results of their study looking at two group sets of collaborators. One teacher group set, chosen by the administrator, and the other teacher group, chosen by the teachers themselves. What the research shows is, teachers are aware of whom they are compatible with and that the collaboration will be much more beneficial if allowed to work with a chosen person. The teachers in the self-select section of the study reported higher levels of efficacy and shared responsibility in their teams. However, they do note that, like other studies of this type, the results are correlational. They also show that the data may suggest that teachers who self-select their groups may not be as committed during the meeting times and may take that time to pursue social agendas, which may in fact lead to lower productivity.

Yaun and Zhang (2016) looked at the issues around collaboration in a four-year retrospective study. Like Krammer et al. (2018), Yuan and Zhang (2016) looked at the difference between administration-directed collaboration and the more organic, teacher-selected collaboration. Their study came up with some interesting, though not unsurprising results. They found that the structure of the administration-mandated collaboration was more concrete, however the results were less organic. The results showed three areas that can lead to productive collaboration: the collaboration must exist in a supportive environment; it must also have time, space, and a defined communication structure; and it must also have the resources and support. The importance of this study again amplifies the fact that collaboration, though not required to be teacher-chosen and organic, works better when the teachers select their group and not when chosen by the administration.

The idea of conflict in collaboration needs to be looked at as well as the best methods to try to defuse that conflict. Lee et al. (2015) looked at two classrooms that employed collaborative PBL and looked to see which types of intra-group conflict would affect outcomes. They looked at three types of intra-group conflict and the effects they had: task-related conflict (how to complete the task), process- or procedure-related conflict (who was responsible for what) , and relationship- or personality-related emotional conflict (dislike or personal animosity within the group). Most groups had multiple levels of conflict that hindered the group dynamic. The findings also showed that the task and process conflicts tended to lead to relationship conflict when the social skills of the group were low. They suggest that if there is a person with high social skills in every group to help dissipate the emotional conflict, that should decrease the likelihood of conflict, though the reasoning why is based on a myriad of social psychological theories. Conflict in a group does not have to be detrimental as long as it is not personal. By creating groups with similar interests, and task goals, can lead to good collaboration as long as there is not a history of personal conflict. This is backed by all the studies mentioned above; choice and collegiality are key factors to success, whether you are a student or teacher.

Collaboration can also influence the way in which teachers see their students and their work. Lepareur and Grangeat (2018) looked at inquiry-based science teaching (IBST) which has been gaining prevalence in education. This article looked at the impact of collaborative practice. Teacher collaboration has four key steps according to this model; goals (what for), cues (what), repertoire of actions (how), and reference knowledge (why). The study showed that teachers who attended collaboration training tend to have a more student-focused outlook as compared to the teacher who did not attend the training and therefore focused more on a teacher-centered outcome approach. Collaboration supports more variable teaching practices, as well as

stimulating teacher confidence and motivation within a classroom. However, with new methods of delivery, whether or not you are an established teacher or a new teacher, it is important to understand that collaboration is just one part of what makes good instruction, along with clarity of expectations, diversity recognition, and goal setting.

Overall, the research suggests that collaboration is the most effective when it is organic and has been grouped by the professionals themselves and not from the administration. However, the research also shows that the administration creating time, support, and structure will lead to increased outcomes. Lee et al. (2015) also showed that conflict may arise during collaboration and that that is not necessarily a bad thing as long as it does not go to the stage of personal conflict between group members. If there is a highly emotionally skilled person in the group that can diffuse the situation, then the group will be more functional. One could state, from the research mentioned above, that a group of self-selected people work better together. Furthermore, greater results are possible if that group is placed in a situation that is designed by administration, to allow them the time and freedom to work together. Lastly, if those people have the ability to disagree on the task and process, and those disagreements are not made personal, then there is a chance for very effective collaboration.

Co-Teaching

Team teaching is a major component of our project. We are going to be looking at one class of learners utilizing the skills of three teachers to complete this project. Research has been done in the area and we will look at the ramifications of that research to help guide us on our journey.

Plank and Rhem (2011) have a case study of a course taught at the Connecticut College on Fine Arts and the Community. The course was split between two instructors that had to share the class teaching and come together to write a syllabus and teach the course. The results were that they truly enjoyed teaching the course, but they did state that the teachers working together need to get along as they will be together a great deal of the time. Buckley (2000) shared this sentiment on compatibility with your team-teaching partner. She goes on to show that a good team-teaching unit should have multiple structures in place that will lead to good execution of the class, for both the students and the teachers, by talents being pooled. She states that,

> [t]eam teaching involves a group of instructors working purposefully, regularly, and cooperatively to help a group of students learn. As a team, the teachers work together in setting goals for a course, designing a syllabus, preparing individual lesson plans, actually teaching students together, and evaluating the results. They share insights, arguing with one another and perhaps even challenging students to decide which approach is correct. This experience is exciting. Everybody wins! (p. 2)

This further shows the influence and strength that can be drawn by combining professional educators' expertise in a single class.

However, the thought of team-teaching may not appeal to some people. According to Androutsos and Brinia (2019), they state that it is essential in the modern economic and vocational realities that the learners are being prepared for. They further go on to explain that the educational system needs to reshape the way it delivers and trains learners by being more experimental and visionary with the delivery of education. Their article discusses the issues

around the rigidity of our current educational structure and the ways it does not allow the students to prepare for a new economy. It focuses on the designerly way of thinking, entrepreneurial ideals, and digital competencies. The authors assert that the best way to get our learners ready for this change, is by incorporating these into all facets of the school that can be reached through team-teaching and co-creation. In their discussion section, they state that a "proposed pedagogy enhances innovative, collaborative, and co-creative student competences" (p. 8).

The problems with team teaching, in some ways, mirror the issues with collaboration, which is compatibility. If teachers are put in a situation of working with people they are opposite to in style, personality, or pedagogy, that could eventually lead to personality conflicts, the partnership has little chance of true success. As mentioned in the collaboration section of this paper, and also stated by Buckley (2000), and Plank and Lehm (2011), there has to be compatibility. Furthermore, they found that the students were sometimes confused as to who the teacher, or authority, was in some situations. That is an issue that needs to be addressed, or at least anticipated, in the planning phase of our project. Androutsos and Brinia (2019) further show some limitations to their study that must also be taken into account. They state that the sample is small, and that the learners were adults, solving problems in the fields of technology and entrepreneurship, so the data may not translate to the regular K-12 classroom. One could argue that this translation issue is not a weakness, but a strength, in that it teaches learners to think in a way that is out-of-the-box and will lead to greater problem solving, teamwork skills, and clarity of purpose, in an information-saturated world.

Inquiry-Based Learning

There is an abundance of research on the inquiry method as it applies to classrooms in both teacher efficacy and learners' knowledge acquisition. This section will concentrate on a number of articles that will lend support, credence, and caution to our desired collaborative inquiry-based project.

The first question must be, what is inquiry itself and what are the steps? Hong and Melville (2017) looked at the professional-development opportunities for American of Learning Inquiry in a summer workshop around lessons involving Graphic Information Systems (GIS). They used the framework of the National Council for the Social Studies (NCSS) that is based on four dimensions:

> Dimension 1, teachers and students craft questions to focus and guide the inquiry process. In Dimensions 2 and 3, students apply knowledge and thinking processes from the social studies disciplines (e.g., civics, economics, geography, history, etc.) as they gather appropriate sources and evaluate evidence to answer their inquiry questions. Finally, in Dimension 4, students communicate the conclusions of their inquiry and take informed action on a relevant issue in their community. (p. 229)

This is buoyed by the findings of Michos et al. (2018), who did research on the effectiveness of teacher inquiry into their own teaching practice, in the use of Technology Enhanced Learning (TEL) situations. Their framework for inquiry was:

> Step 1) problems and questions.

Step 2) design intervention and evaluation.

Step 3) data collection and Analysis; and

Step 4) reflection and proposed changes.

As can be seen, the idea and stages of inquiry, though different in title, all stem from the idea of question, design, create, and show with most having a reflection component.

A further look at inquiry by MacKenzie (2016) takes the basic stage process seen above and explains the different project levels of student inquiry based on a student's abilities and past inquiry knowledge. These levels include: structured inquiry, controlled inquiry, guided inquiry, and free inquiry. These different levels are important as not all learners, based on ability or experience, can do free inquiry. This idea of structured inquiry is also implemented by Chu et al. (2017), where they propose an incremental increase in complexity in inquiry tasks. Furthermore, from their results, it is important that we as educators know the strength and experience of our learners and adapt the structure accordingly. What makes this and MacKenzie's (2016) leveled structure, that was inspired by the work of Fitchman (2011), so important is, as teachers, we have a sequential process that we can implement within a class based on the needs of the learner(s). Moreover, according to McGrath and Hughes (2017), students with learning disabilities may gain real insight into the topic, as long as the inquiry remains structured with possible peer intervention and explicit teaching. Therefore, inquiry models and teaching must be diversified in an inclusive classroom, to meet the needs of the classes, or individual students involved so they are not put into a position of frustration and failure.

Beyond the idea of different structures based on the abilities and experiences of the students, one also has to look at the benefits of student choice. Lewis et al. (2018) wrote about

how the inclusion of choice, and voices, in their learning allow for greater interest. This interest, they say, will lead to a deeper level of learning and a very peaked curiosity. Like MacKenzie (2016) and McGrath and Hughes (2017), Lewis et al. (2018) also point out the system supports all learners based on the inquiry structure required, which adds to the idea that all people learn differently, and that inquiry is a more inclusive method. They also state that though technology can be a very powerful tool, it does not need to be the main emphasis, and students can work at their own vision in a way that represents their learning. However, though I agree with this idea, and support the careful use of technology, the idea will not be applicable to our project, as technology is integral to the project's completion and we have the specialized teachers to help the learners implement this technology.

Lewis et al. (2018) also agreed with Mackenzie (2016) on the idea that the major stumbling blocks that teachers have to be aware of, are students struggling with creation of their open-ended initial question, and how to find the information. Therefore, the scaffolding and pre-teaching must be front loaded, but it will be worth the effort. Furthermore, and more applicable to our project, inquiry allows for, and encourages, teachers to work together to create poignant and current lessons, or projects, that will challenge both the students and educators.

When this idea is tied in with Androutsos and Brinia's (2019) recognition that the goal is to prepare students for the problem-solving aspects of the new economy, then it is important to look at the inquiry model as a future resource. Furthermore, McNair (2017) speaks of the value of the inquiry method for students, as it allows them to wonder and create, which is facilitating both resilience and fortitude, as well as a joy for learning. She also mentions that this will help inspire collaborative work environments that will prepare students to work in groups and tie personal success with group success. Chu et al. (2017) discuss that the increase in learning and

preparation for the future is key through inquiry, as the students, and teachers, will increase their core competencies and abilities in many areas instead of a certain singular skill to be learned.

Inquiry, in our project, was the driving force behind the resource collection and design aspects. The learners worked to design and create their groups vision for their display section of the Truth and Reconciliation board. Teamwork and creativity are an essential skill that students will need moving forward in school and in life. As has been shown in this section, if the steps of inquiry are followed and adapted to meet each learner's needs, then they should be set-up to have success and a sense of achievement. Furthermore, we, as teachers, can model how to work collaboratively, as a team, to foster the growth and abilities in the learners' later lives. Inquiry, at its core, is a multi-tiered approach that can support diverse learners that allows all to succeed to their ability. What makes inquiry such a useful tool, is it teaches people to adapt, plan, execute, and most importantly reflect. In fact, reflection is something many professionals do often as it is essential to furthering practice. By teaching the students about reflection and redesign, they are more likely to have the ability to adapt when a plan is not working. This skill goes beyond the students' needs in their educational career.

Summary

This literature review examines areas that we are going to incorporate in our study. We, as a group, value the ideas and principles around collaboration, PBL, inquiry, co-teaching, and action-based approach of researching ourselves as educators. Our school, and classrooms, are full of diverse and talented students that will, we envision, gain autonomy and insight from a less rigid, more expressive way of displaying their learning within the parameters set out by us. We, as a small rural school, want to invest time in making a collaborative, inquiry-based learning

environment gain stability and acceptance, so that we can engage more students in their passions while fulfilling the curriculum. Furthermore, we must heed the evidence-informed research findings regarding collegiality and how to function as a team-teaching group. This will require that we have well-defined goals and ensure that each step is planned so as to not confuse the learners, or ourselves. There will also have to be many levels of inquiry thinking available in place to make sure that each group can have success. I am very excited as to what will transpire during this journey and I hope the results are as powerful as we envision.

References

Androutsos, A., & Brinia, V. (2019). Developing and Piloting a Pedagogy for Teaching Innovation, Collaboration, and Co-Creation in Secondary Education Based on Design Thinking, Digital Transformation, and Entrepreneurship. *Education Sciences*, *9*(2), 113. doi:10.3390/educsci9020113

Boss, S. (2012, October). *The Challenge of Assessing Project-Based Learning*. ERIC - Education Resources Information Center. https://eric.ed.gov/?id=EJ984773

Buckley, F. J. (2000). *Team Teaching: What, Why, and How?* Thousand Oaks, CA: SAGE.

Captcha. (n.d.). Retrieved from https://saskschoolboards.ca/wp-content/uploads/97-07.htm

Chu S.K.W., Reynolds R.B., Tavares N.J., Notari M., Lee C.W.Y. (2017) Guides and Suggestions for Classroom Implementation. In: 21st Century Skills Development Through Inquiry-Based Learning. Springer, Singaporedes and Suggestions for Classroom Implementation"

Clandinin, D. J., & Husu, J. (2017). *The SAGE handbook of research on teacher education*. SAGE.

Constructivism as a paradigm for teaching and learning. (n.d.). Retrieved from https://www.thirteen.org/edonline/concept2class/constructivism/

Educator Update: Classroom Assessment, March 2017. (2009, March). https://curriculum.gov.bc.ca/sites/curriculum.gov.bc.ca/files/pdf/updates/201703-educator-update-classroom-assessment.pdf

Efron, S. E., & Ravid, R. (2013). *Action Research in Education: A Practical Guide*. New York, NY: Guilford Press.

Fitchman. (2011). *Inquiry-based learning - Computer lab*. Google Sites. https://sites.google.com/site/mrshortreedcomputerlab/student-inquiry

Gary, K. A. (2015). Project Based Learning. Computer, 48(9), 98-100. doi:10.1109/MC.2015.268

Gottlieb, L., and Rathmann, I. 2014. Udviklingen af kollegiale vejledningsfunktioner: AKT- og inklusionsvejledere [Development of Counselling]. In *Elevers læring og udvikling – også i komplicerede undervisningssituationer* [Students' Learning and Development – In Complicated Learning Situations], edited by O. Løw and E. Skibsted. Copenhagen:

Gray, A. (1997). *Constructivist Teaching and Learning*. https://saskschoolboards.ca/wp-content/uploads/97-07.htm

Hedegaard-Soerensen, L., Jensen, C. R., & Tofteng, D. M. (2017). Interdisciplinary collaboration as a prerequisite for inclusive education. *European Journal of Special Needs Education*, *33*(3), 382-395. doi:10.1080/08856257.2017.1314113

Hess, K. K., Jones, B. S., Carlock, D., & Walkup, J. (2009, March). *Cognitive Rigor: Blending the Strengths of Bloom's Taxonomy and Webb's Depth of Knowledge to Enhance Classroom-level Processes*. https://files.eric.ed.gov/fulltext/ED517804.pdf.

Hong, J. E., & Melville, A. (2017). Training Social Studies Teachers to Develop Inquiry-Based GIS Lessons. *Journal of Geography*, *117*(6), 229-244. doi:10.1080/00221341.2017.1371205

Jordan, E. A., & Porath, M. (2006). *Educational psychology: A problem-based approach*. Allyn & Bacon

Krammer, M., Rossmann, P., Gastager, A., & Gasteiger-Klicpera, B. (2018). Ways of composing teaching teams and their impact on teachers' perceptions about collaboration. *European Journal of Teacher Education*, *41*(4), 463-478. doi:10.1080/02619768.2018.1462331

Lam, S., Cheng, R. W., & Choy, H. C. (2010). School support and teacher motivation to implement project-based learning. Learning and Instruction, 20(6), 487-497. doi:10.1016/j.learninstruc.2009.07.003

Lee, D., Huh, Y., & Reigeluth, C. M. (2015). Collaboration, intragroup conflict, and social skills in project-based learning. Instructional Science, 43(5), 561-590. doi:10.1007/s11251-015-9348-7

Lepareur, C., & Grangeat, M. (2018). Teacher collaboration's influence on inquiry-based science teaching methods. *Education Inquiry*, *9*(4), 363-379. doi:10.1080/20004508.2018.1428037

Lewis, K. R., Simmons, S., & Maniotes, L. (2018, 04). Building a culture for learner voice and choice through inquiry. *Teacher Librarian, 45*, 24-27. Retrieved from http://search.proquest.com.ezproxy.library.uvic.ca/docview/2036981520?accountid=14846

McGrath, A. L., & Hughes, M. T. (2017). Students With Learning Disabilities in Inquiry-Based Science Classrooms: A Cross-Case Analysis. *Learning Disability Quarterly*, *41*(3), 131-143. doi:10.1177/0731948717736007

McNair, E. L. (2017). Personalizing learning: Think like a teenager! *Knowledge Quest*, *46*(2), 28-35. Retrieved from

http://web.a.ebscohost.com.ezproxy.library.uvic.ca/ehost/pdfviewer/pdfviewer?vid=1&sid=cf976dee-772f-45ac-b348-8bf3586b5485%40sdc-v-sessmgr03

Michos, K., Hernández-Leo, D., & Albó, L. (2018). Teacher-led inquiry in technology-supported school communities. British Journal of Educational Technology, 49(6), 1077-1095. doi:10.1111/bjet.12696

Plank, K. M. (2012). Team Teaching: Across the Disciplines, Across the Academy. Stylus Publishing, LLC.

Pugach, M. C., Blanton, L. P., & Correa, V. I. (2011). A Historical Perspective on the Role of Collaboration in Teacher Education Reform. Teacher Education and Special Education: The Journal of the Teacher Education Division of the Council for Exceptional Children, 34(3), 183-200. doi:10.1177/0888406411406141

Simpson, T. L. (2002). Dare I oppose constructivist theory? *The Educational Forum*, *66*(4), 347-354. doi:10.1080/00131720208984854

Spectrum, & Sector, T. (2020, June 26). *Canadian ICT sector profile 2019 - Information and communications technologies*. Language selection - Innovation, Science and Economic Development Canada Main Site / Sélection de la langue - Site principal d'Innovation, Sciences et Développement économique Canada. https://www.ic.gc.ca/eic/site/ict-tic.nsf/eng/h_it07229.html

Yuan, R., & Zhang, J. (2016). Promoting Teacher Collaboration Through Joint Lesson Planning: Challenges and Coping Strategies. *The Asia-Pacific Education Researcher*, *25*(5-6), 817-826. doi:10.1007/s40299-016-0300-7