

Authentic High School Research Experiences: A Meta-synthesis

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Abstract

Research is often associated with both positive outcomes and arduous experiences for high school learners. This meta-synthesis aimed to synthesize findings that examined the day to day interactions and practices among research-engaged high school classrooms and how high school learners engaged themselves in the writing of a research paper. The synthesis generated 6 distinct themes with opposing concepts:

- (1) mapping out the journey vs. navigating independently;
- (2) privileging product over process;
- (3) driving on training wheels vs. steering independently;
- (4) teaching the life beyond while neglecting the primary and secondary skills;
- (5) climbing the brick wall vs. finding the silver lining and
- (6) living the new prescription vs. misconstruing research digitization.

The synthesis translated into two higher-order concepts:

- (1) disorientation on inherent challenges and non-preparation for system reworking and
- (2) balancing preparations and expectations. These concepts consider the experience among high school learners as a foundation for improved instructional practices among teachers and research institutions.

Keywords: Meta-Synthesis, Research Experiences, Research-Engaged, High School Learners

Introduction

Research is a systematic process of discovering new knowledge. It has a widely known significance in providing convenience to a man's life and in giving solutions to some societal problems that affect our communities at large. Moreover, it is an interesting quest of finding more knowledge as it provides far-reaching benefits (Formeloza, R. and Pateña, A., 2013).

Consequently, the Department of Education (DepEd) recognized the importance of institutionalizing research-based decision and policy making through DepEd Order (DO) 65, s. 2003. This move is further strengthened by DO 39, s.2016 that provides guidance on the conduct of educational research on priority research areas and issues that need DepEd's immediate attention. This is consonant to providing relevant and research-based response to problems (Ciocon, 2018). Furthermore, the K to 12 curricula made research as one of its salient features which is to be taken among high school learners. This made high school learners conduct some small-scale researches, say, the Science Investigatory Projects and the basic researches for the senior high school (SHS) students who, under whatever SHS track, must produce quality research outputs for the subjects Practical Research 1 and Practical Research 2.

However, research is a complex area to learn, especially to those who are first time producers and consumers of its intricate methods and processes (Knipe, S., Miles, R., Bottrell, C., 2018). Often, the word research assignment, for most high school (HS) learners, evokes feelings of dreadfulness, skepticism, ambivalence and anticipation. Reasons as to what really is in it that gives unwarranted beats to HS learners is often a subject to many academic discourses. One pointed out to its imposition rather than being an option for the learners to take since the research subject is made part of the curriculum and producing a research output is a requirement for finishing the subject per se. Conversely, students become more uptight at producing viable final output than truly adding more and new knowledge for themselves (Barranoik, L, 2015).

A lot of factors can be attributed to the students' entire research experience. To name a few, most high school learners struggle with language errors and inability to analyze logical arguments and synthesize information from varied sources. This is partly because students are confronted with the challenge of creating a logical sentence on the first place. Gregg (2009) states "Writing today is not a frill for a few but an essential skill for the many." Yet, if the writing ability of a student is way too low or poor, writing and conducting research would become a tedious task to do (Bocar, 2011) and a burden for every student (Ciocon, 2018).

Struggles can be accounted starting from the formulation of the topic down to the more crucial part of analyzing the data and interpreting them. Oftentimes, students try to resolve this by using online research, a method commonly practiced and suggested by most teachers, but this has changed the very meaning of research. Most teachers reported this as a barrier that impede quality online research for most students (Purcell, K., Rainie, L., Heaps, A., Buchanan, J., 2012). Research has been synonymously interpreted as googling as thus, there has been a gleaming transition from the supposed intellectual curiosity and discovery to an expeditiously and interim exercise of task completion. This creates tension between quality of the research and compliance. Students' total experience in the whole research journey can be linked to their levels of motivation, engagement, perception and willingness to learn hard on the course material.

The extent to which they can find enjoyment in meeting the challenges of research is way too complicated. Adequate knowledge, financial attributes, time element and technical prowess need to be present (Narag, E., Gannaban, M. V., Agustin, C. (2016). Moreover, classroom practices must present different activities and strategies to support the students' skills (Lawrence, S., Jefferson, T., Osborn, N., 2017). This boils down to another question as to whether the students have received adequate preparations that could contribute to having a meaningful research experience.

Opportunity gaps on students' achievement in the subject hints to teachers and their teaching practices. However, there had been little focus that is given on the relative intersection of students' research knowledge and the knowledge that teachers bring to the task (Harris, R., 2010). Teaching quality is still a big factor that has a bearing on students' learning opportunities. This includes the practical frameworks and teaching qualities that affect significant achievement gains (Jensen, B., Wallace, T., Steinberg, M., Gabriel, R., 2019) and their general conceptions of what attributes constitute research and how the contextualized interpretation of these attributes are studied (Schouteden, W., Verburgh, A., Elen, J., 2016).

There are way too many identified factors that contributed to the whole research experience among students. It is, therefore, desirable to synthesize findings that examined the day to day interactions and practices among research-engaged high school classrooms and how high school learners engaged themselves in the writing of a research paper. It is hoped that by understanding their experiences, teachers and schools can make research learning among students become purposive and not exhaustive.

Methodology

Design

This study uses meta-synthesis. Several qualitative researches will be selected for analysis and synthesis. Erwin, E., Brotherson, M. J., Summers, J.A. (2011) states that synthesizing a collective body of qualitative researches to

identify common themes would give deeper insights about a certain phenomenon which may not be available in a single study. Meta-synthesis allows researchers and other interested readers to have broader perspective of the same topic. Common themes about some phenomena will be generated regarding the lived experiences of both the teachers and students and the challenges they encountered while teaching and learning research.

In order to provide high school research instructors and high school student researchers some empirical evidences, findings, conclusions and recommendations on the lived experiences of the students in their research journey, this meta-synthesis is conducted.

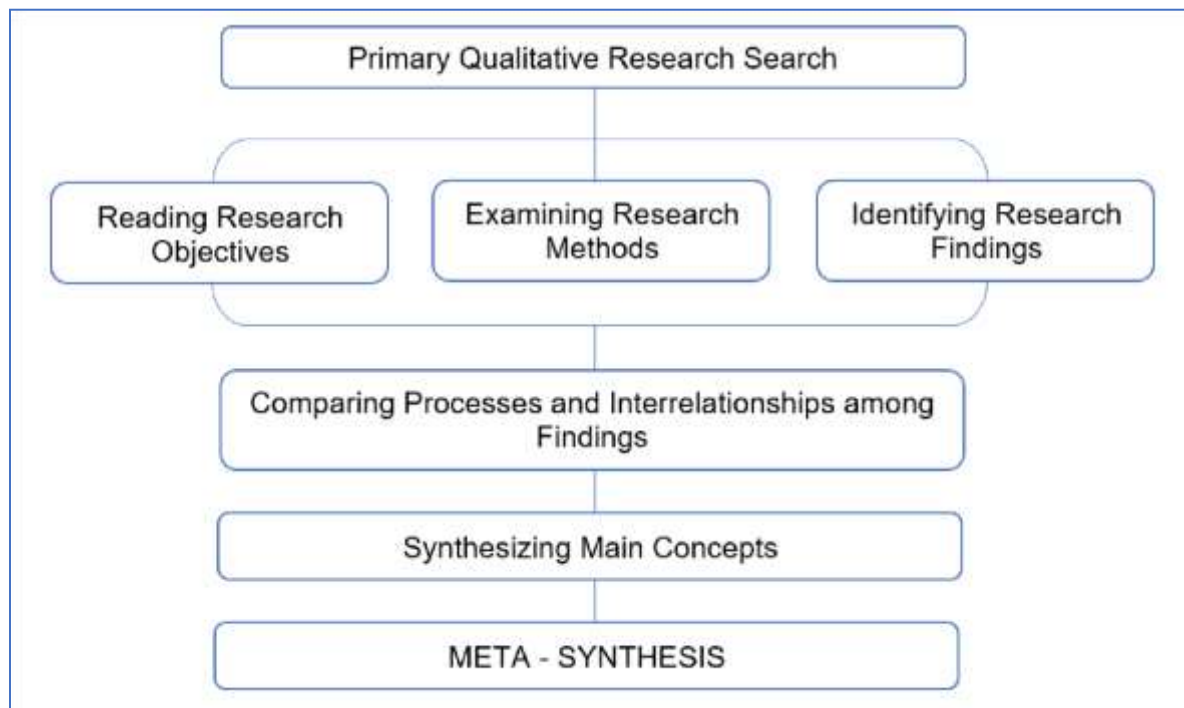


Figure 1. Components of the synthesis process adapted from Thorne (2002), Sandelowski, Trimble, Woodard and Barroso (2006).

Data Collection

Search Terms and Procedures

The nature of the study sampling in meta-synthesis is iterative, selective and purposive. The initial literature was purposefully searched for by retrieving related articles from databases such as Research Gate, International Journal of Science Education, International Journal of Education and Research, ProQuest, Journal for Research and Practice in College Teaching, Google Scholar, Education Research Information Center (ERIC), Philippine e-Journals, CORE, Science Open, Education Process: International Journal, Directory of Open Access Journals, AirXiv e-Print Archive, Social Science Research Network, Taylor and Francis Online, Emerald Journals and School Library Media Research.

The search terms include and combine ‘high school research’, challenges of high school research’, ‘lived experiences of high school research students’, ‘lived experiences of student researchers’, ‘high school research capabilities’, ‘high school research outputs’ and ‘high school research activities’ along with some relevant concepts on the search database were employed as potentials for this metasynthesis. The initial search yielded a total of 113 journal articles and research studies published from 2000 to 2019. This study, however, included only 7 articles that met the selection criteria.

Quality Considerations: Inclusion and Exclusion Criteria

Meta-synthesis requires careful and expounded criteria for both the inclusion and exclusion of primary research studies (Welch, 2008). To ensure that only those that would serve the purpose of this study are included, the number of potential papers, articles and journals were reduced using the predetermined criteria. First, the inclusion of peer reviewed published dissertations, thesis and journal articles. This led to getting an approximately 113 studies that appeared relevant. Second, the inclusion of full text paper that clearly presented the results and data types generated. Twenty-two of them whose full text cannot be located were eliminated from the roster of potential studies.

Third, in order to consider the timeliness of the studies, only those that were published from 2000 to 2019 were considered. Fourth, this study limits to qualitative research designs, that is to include single-case studies, multiple-case studies, phenomenological studies, grounded theories, narratives, historical, ethnographical and basic qualitative researches. This led to excluding a total of 45 potential papers. However, this study does not exclude those that employ mixed methods i.e. studies that combined quantitative and qualitative approaches. However, stricter inclusion criteria are applied for this: 1) the study must adhere to the predefined themes of the meta-synthesis; 2) only the qualitative data types and results are included in the analysis; 3) rationale for choosing the method is clear with definite selection criteria for the informants and locale of the study; and 4) the sampling strategy that were used must be appropriate. This led to excluding 27 potential papers.

Finally, the paper must present relevant themes, and careful and systematic analysis and interpretation of data. This led to excluding 12 more papers. It is hoped that the criteria set would equate rigor in the realm of qualitative studies.

Data Analysis

Erwin, Brotherson and Summers (2011) presented a summarized concept on the process of conducting meta-synthesis into six steps. This incorporated the criteria and considerations delineated by Major and Savin-Baden, Sandelowski, and Nobbit and Hare. This meta-synthesis adapted the six-phased interpretive approach as stated: 1) formulating a clear research problem and question; 2) conducting a comprehensive search of the literature; 3) conducting careful appraisal of research studies for possible inclusion; 4) selecting and conducting meta-synthesis techniques to integrate and analyze qualitative research findings; 5) presenting synthesis of findings across studies and 6) making reflective conclusions.

The first three steps draw out relevant philosophical and theoretical discussions, culling out the purpose of each paper that is relevant to the study. Step 4 involves gathering and collecting evidences to be distilled and interpreted. Step 5 involves creating and identifying common themes, sub-themes, patterns and features which are to be presented in the results section of this study. Finally, the last step presents the conclusions reflective to the results.

Coding the Data

Once the initial checking of the papers is done and the researcher has come with the final list of the papers to be included in the synthesis, each paper will then be subjected to individual scrutiny. Careful note taking will be made on the prevalent themes, metaphors, concepts, and categories. Analysis will follow on how those concepts, individual themes and categories coalesce to form broader themes. A template will be made for easy reference, segregation and combination of those generated common themes.

Relationships within and across study findings will be identified and leveling of the different themes will be established. Careful reading and rereading of each paper is advised so as not to leave out important findings that will constitute to the new common themes for the synthesis. Elliot (2018) cited Miles and Huberman's suggestion of using a priori list of codes and categories. Results from the initial coding can be classified accordingly with reference to the a priori list. Open coding will be used to identify and code all relevant code

across the 7 studies. Axial coding will then be used to identify the relationship that exists among the codes. Most important thing to consider is that all categories, themes and sub-themes should fit perfectly yielding better results of this meta-synthesis.

Results

This meta-synthesis involves meta-method analysis and meta-data analysis of different qualitative researchers. The meta-method analysis is summarized in Table 1.

The Meta-Method Analysis

This meta-method analysis is done to determine how the nature of the research created an impact on the findings of the studies. Each of the studies were analyzed in order to determine how the authors present the aim or focus of the study, research design, data collection and data analysis. Table 1 indicated that the studies were all qualitative in nature.

Table 1. Key methodological features of the selected studies.

Citation	Focus of Study	Design	Data Collection	Data Analysis
1. Buck, P. E. (2003)	Research experiences for high school teachers and students	Mixed method (Quantitative - Phenomenological)	Interview and Self Reflection	Thematic Analysis Inductive Analysis
2. Gordon, C. (2000)	Effectiveness of an assignment that requires primary research methods	Qualitative action research	Interviews and Focus Group Discussions	Thematic Analysis
3. Harris, (2010)	Students' experiences in a student-centered learning as opposed to teacher-directed research learning	Ethnographical	Interviews, Focus Group Discussions and Observation	Thematic Analysis

<p>4. Lawrence, S.A., Jefferson, T. & Osborn, N. (2017)</p>	<p>Engaging diverse learners in the research process</p>	<p>Mixed method (Descriptive – Basic Qualitative)</p>	<p>Interviews</p>	<p>Thematic Analysis</p>
<p>5. Paurillo, P. (2019)</p>	<p>Research writing ability among senior students</p>	<p>Mixed Method (Descriptive – Basic Qualitative)</p>	<p>Focus Group Discussions</p>	<p>Thematic Analysis</p>
<p>6. Purcell, K., Rainie, L., Heaps, A., Buchanan, J., Friedrich, L., Jacklin, A., Chen, C., Zickhur, K. (2012)</p>	<p>Teens’ research habits and key skills in the conduct of effective research in a digital environment</p>	<p>Mixed method (Descriptive – Basic Qualitative)</p>	<p>Online and Inperson Focus Group Discussions</p>	<p>Thematic Analysis</p>
<p>7. Vossen, T.E., Henze, I., Rippe, R.C.A., Van Driel, J.H., De Vries, M. J. (2018)</p>	<p>Experiences and attitudes of secondary school students towards doing research and design activities with the inclusion of selfefficacy</p>	<p>Basic qualitative study</p>	<p>Interviews and Focus Group Discussions</p>	<p>Thematic Analysis</p>

The Meta-Data Analysis

The methodological process described above was used to generate six distinct themes with opposing concepts: (1) mapping out the journey vs. navigating independently; (2) privileging product over process; (3) driving on training wheels vs. steering independently; (4) teaching the life beyond while neglecting the primary and



secondary skills; (5) climbing the brick wall vs. finding the silver lining and (6) living the new prescription vs. misconstruing research digitization.

Mapping out the journey vs. navigating independently

Anyone fresh enough to embark a new journey would most likely need a driving map while others who enjoy being lost then getting back the track may want to navigate independently. Harris (2010) stated that some traditional teacher drives the students in a direction he or she wants them to. With a clearer goal put in place, many students prefer a straightforward path with materials being laid out.

For instance, one student admitted not knowing where he wanted to go in his research (as is supported similarly by the other findings). He asked for his teacher where the latter wanted him to go but the teacher made him realized where he wanted to go himself. This confused him more because if the teacher wanted him to go further, he must have that map ready for his research journey. That was not what true research is all about. In order to appreciate the formulation of new knowledge, one must look into his interest and use it to direct and redirect his research path while trying to discover and rediscover new paths and formulate new knowledge distinctively and independently. Studentcentered research learning draws out the students' self-discovery of knowledge – a rich preparation to transition from high school dependence to post-secondary independence.

Privileging product over process

"I probably wouldn't take it if I didn't have to...but for compliance..."

Students can excel with motivation. Undeniably, there is enforced compliance in most educational system. And while this system holds true, there would be few opportunities for students to engage in writing assignments that emphasize their writing ability to construct opinions and ideas. As a result, students follow a rehearsed format and students are rated at how well they follow grammar, syntax, documentation, etc. For anyone who followed the format, one may be given a fair rating or a better one, but data quality could be sacrificed.

Many means have been put in place and practiced by students. To mention, technology change the true meaning of research. Students have better access to information but missing out accessing and interpreting the greater depths and breath of the information as sorted necessary for the topic of interest. Over engagement to multimedia search engines fails students to critically judge the quality of information present in online databases, etc. and that they tend pulling into copy-pasted opinions and ideas from the search engines. This practice among students limited them to appreciate and learn the process in writing a research paper.

Driving on training wheels vs. steering independently

Research is something very new to students and their first formal writing exposure that requires rigid skills and knowledge from topic formulation to making a valid and reliable interpretation. It is something that students cry foul should they be left on their own to complete the rudiments of producing quality research output. Most often, students got used to transmission method as operationalized by how teachers transmit and transform their knowledge to digestible chunks of valuable concepts for the students to take in. This is the standard learning environment that most high school research learners experienced in a typical research class - something that keeps them driving with the teacher helping them push the pedals for them not to venture off.

One noted that, "...they (teachers) lay out what you have to do...they tell you not to do that when you venture off..we like it.."

Clearly, some students resist to the student-driven pedagogies as they experience more difficulty trying to compose their research. Student-driven pedagogies often make them experience difficulties like keeping in track with their topic of interest. Questions revolve around having a way too broad or narrow topic, limited or too

generalized responses that can be drawn out or collected and many others when trying to independently approach their own research topic.

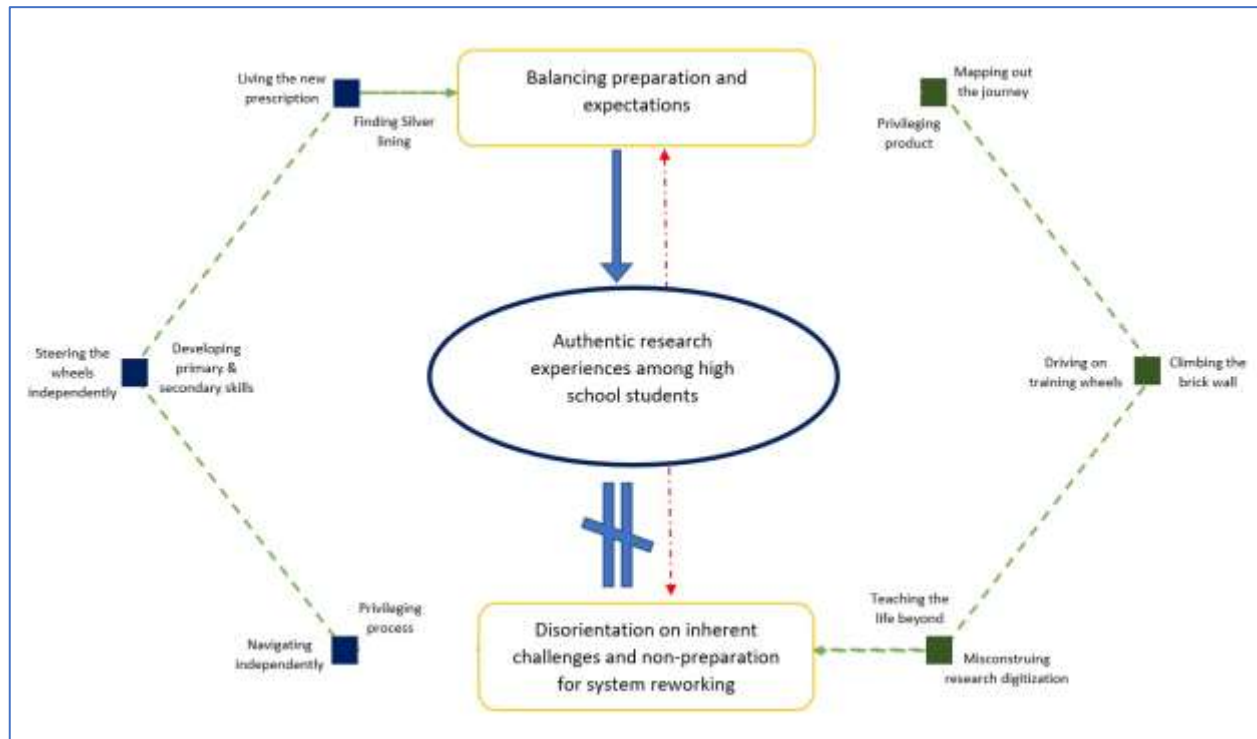


Figure 2. Diagrammatic summary of the themes from the synthesis.

Teaching the life beyond while neglecting the primary and secondary skills

There are a lot of promises that research brought about to students, but they were not taught the needed skills to succeed in it. Research requires academic success in reading, writing, note taking, interpreting, analyzing, decoding and many others. While constantly practicing and honing these skills, eventually new set of skills come to foster. Those are the incidental secondary skills that they acquire through time. These secondary skills are described as the learners’ personal control over their social, intellectual and academic skills. These are the necessary skills that a learner should possess should they want to warrant themselves success in their future endeavors. Those are the skills that they pull back in and rely on all throughout their adult lives.

Secondary skills are shown when students practice self-discovery, independent learning and thinking, effective communication and taking personal responsibility over whatever, matters. However, when students are too engrossed into making and complying an output, tendency is they forget the most important values and learning that they ought to get from doing research. Lifelong learning in research lies on the ability to figure out what they are passionate about doing, i.e. looking into a topic that is of most relevance, importance and significance; ability to overcome challenges and become persistent and above all having a broader perspective in looking what lies beyond the practice of doing research. When students have that realization that research is about making intelligent choices, then the possibility of leading towards success is higher.

Climbing the brick wall vs. finding the silver lining.

One student noted, “The teacher failed it...but it helped me learn it better.” This is but one healthy attitude that a student can possess while doing research. Good if students could see the beauty in failure, however, the findings from the studies included in this synthesis found to have had more students who resort to feeling

dejected when things don't go as expected. It is also noteworthy for some students who finds the silver lining in everything.

For most students whose orientation to research is not very good would dare say that engaging themselves in the research journey is climbing a brick wall – something insurmountable and almost entirely impossible and difficult. What have caused this? First, students resist and are not open-minded to the kind of approach that their teacher is employing in the class. There is disequilibrium between the teacher's pedagogy and the students' learning style. Second, sticking to the comfort zone. Many students would not want to venture out and become the driver of their own research journey. This over dependence impedes them from truly discovering how else they can do better in writing their paper. Third, they become a victim of reporting overdose. Due to poor time management, limited academic skills (as defined previously), reporting the research result has become an exhaustive exercise for them. Finally, when students look at research as an extension of the class practice done like a test. This misconception of the research per se has contributed to their unhealthy research experience.

Living the new prescription vs. misconstruing research *digitization*

Student researchers are now labeled as authentic researchers. Most often, topics were drawn from the learners realistic and genuine ideas from what they see around them. However, this label had somehow added some pressure on how they could come up with having quality research output at a minimum time. Thus, most students resorted to becoming internet dependent. This dependency to the internet is misconstrued research digitization.

It is observed that learners nowadays, do not rely heavily on library resources but rather on internet sources. But if students have that limited skill on information filtration, they are most likely to create fabricated outputs or worst a copy-paste of what they see similar to what they are currently researching on. Authentic researching is about making authentic assessment of the topics at hand and data sources at hand and yielded authentic research feedback.

Furthermore, the synthesis translated into two higher-order concepts: (1) disorientation on inherent challenges and non-preparation for system reworking and (2) balancing preparations and expectations.

Disorientation on inherent challenges and non-preparation for system reworking

A student-centered research classroom is an exciting and challenging one for the those who are prepared to rework or possibly change the system they got used to. That is, when students see the beauty in taking full accountability and personal control over their research endeavor, student-centered pedagogy would give them a rewarding research experience.

However, when students have been disoriented on the inherent challenges that went along with research, their experience can be a nightmare and if not because research is a subject that they should take or a competency that must be accomplished, their choice would redound to not doing research at all.

Balancing preparations and expectations.

Learners who come to one classroom are generally diverse. First, they differ in their preparations and expectations in making research. These variations contribute significantly to the type of output that they bring into the class and of course the learning experience that they got. By saying preparations, this is not limited to the students' academic preparations but also their personal and social preparations. More often, high school research is done in a group which need more social interactions among group members. Cooperation is equated to contributing valuable inputs to the group's output. Also, preparation means access to better equipment and resources. This is found to give more meaningful research experience among students.

When enough preparation is balanced with the right amount of expectation, learners start appreciating the process of research itself, finding enjoyment amidst all challenges and developing a skill set necessary for post-secondary research independence.

Conclusion

The aim of this meta-synthesis is to promote understanding on the day to day interactions and practices among research-engaged classrooms and how high school learners engaged themselves in the writing of a research paper.

Research is a daunting task for every high school learner that if they have not had enough preparation to rework the system, they have gotten used. Research requires personal control and self-discovery, as thus, learners need to possess the needed primary and secondary skills so that they would have a lifelong a meaningful research experience.

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Conflicts of interest

The author declares that he has no competing interests.

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